ABRIDGMENTS

OF THE

Specifications

RELATING TO

METALS AND ALLOYS

(EXCEPTING IRON AND STEEL).

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PREFACE.

THE Indexes to Patents have become so numerous, that to purchase the entire series might in some cases entail too much expense upon a large number of inventors and others to whom they have become indispensable.

To obviate this difficulty, short Abstracts or Abridgments of the Specifications of Patents under each head of Invention are prepared for publication separately, and are so arranged as to form a Chronological, Subject-matter, Reference, and Alphabetical Index to the class to which they respectively relate.

As these publications do not supersede the necessity for consulting, in cases where the fullest information is requisite, the Specifications from which they are compiled, the prices at which the latter are published have been stated. In this series are comprised Abridgments of the Specifications relating to Metals, and their mode of manufacture and treatment, and to the Alloys formed by mixing various metals together. For the Specifications of Letters Patent relating to Iron and Steel, the series of Abridgments

specially relating to Iron and Steel, and published at the Great Seal Patent Office, should be referred to.

In some cases where the Specifications which relate to Apparatus and Machinery are intimately connected with the process of manufacture they are contained in this series. It is intended, however, to form a separate series of Abridgments relating to Machinery for Shaping and Working Metals, which, in connexion with the series already published relating to the processes used in their manufacture, will complete the subject.

B. Woodcroft.

Great Seal Patent Office,
February 1861.

INDEX OF NAMES.

METALS AND ALLOYS.

(EXCEPTING IRON AND STEEL.)

A.D. 1623, September 20.—N° 26.

GOMELDON, William.—"A ꝑfect way, forme, and invencõn "for the smelting or moulting of lead oare in great and large "quanteties by meanes of a furnace invented by him, & by "reason of some ingredient by him vsed not formerlie vsed to "that purpose in any of our domynions by any ꝑson what- "soever otherwise then in small pottꝭ or crusibles, by which hee is "able to extract much more leade then formerlie hath byne "extracted by any thereby; alsoe to make vseful and ꝓfitable "such of our leade mynes within our realme of England as at "this tyme serve for noe other vse but onelie to glase pottꝭ." The invention relates to the use of sea coal, whereby great saving is effected by the preservation of the wood and tymber "alreadie "much wasted." The Letters Patent were granted for 21 years, and a royalty of 12 pence per ton was to be paid to the king.

[Printed, 4*d.*]

A.D. 1630, August 13.—N° 51.

BALL, Edward; LASSELL, Edmond; HAMPTON, Robert; AULEY, William.—"The meanes soe to prepare and order the "fuell of peate or turffe, by reduceing into a coale, that it shall "serve for the makeing, melting, forging, and fyneing of iron, "lead, and tynn, and for boyleing of salt, and for the burning of "bricke, tyle, and lyme, or any other thing whatsoever for "building, or otherwise, to bee made of earth, without the "addicõn or vse of any wood, charcoale, pitcoale, or seacoale." The Letters Patent were granted for 14 years. Right of search was granted in case of suspected infringement. A yearly payment of six pounds thirteen and fourpence was to be paid to the king.

[Printed, 4*d.*]

A.D. 1630, November 11.—N° 53.

RAMSEYE, David.—"A new invencon, waie, or meanes to make "sepacon by takinge of the seacond scume of all such mettalls of "tinne, leade, and copper after the drosse is taken, and preserving "as well the impure mettall as the pure." The invention related to the separation of gold and silver from other metals with the ores of which they were combined, and thereby saving the metals that were "dayly castawaie," owing "to want of experience."

The Letters Patent were granted for 21 years. After the first two years a tenth part of the products obtained was to be paid to the king. The patentees also covenanted to deliver to the king at the Tower of London all the gold and silver they obtained, in exchange for an equivalent price in "readie mony."

[Printed, 4d.]

A.D. 1632, December 7.—N° 61.

JORDEN, Edward.—"A way to melt tynne, iron, lead, and "copper oare with pitcoale, peate, and turffe, and will therewith "extct out of like quantityes as much or more then can be made "with any other fewell, and doe yt with much lesse charge then "is nowe expended in melting the same." The object of the invention was to save timber by substituting for its use that of coal and turfe. The patentee covenanted to pay yearly to the king six shillings and eightpence.

[Printed, 3d.]

A.D. 1635, June 25.—N° 83.

FRANCKE, Thornese.—"The saueing of fewell, labour, ireon, "and tyme heretofore unnecessarily spent and consumed by "brewers, dyers, sope boylers, salt makers, and others of like "nature, whereby alsoe the annoyance of smoake is much "avoyded." The invention relates to "altering the formes of "the melting furnaces, and by contracting the ayre, and causing "and bringing in wnyd into the sayd furnaces, w^{ch} shall make "the fyers burne with as much vyolence as any blast whatsoever." By this invention, all sorts of minerals and metals may be melted "without either water blast or foote blaste," and one-third of the fuel previously used may be saved. The patentee covenanted to pay three clear tenthes of the profits arising from the use of

his invention to the king (Charles I). He was also bound under a penalty of fortie pounds to inroll the grant of Letters Patent in the Court of Exchequer before the Clerke of the Pipe, or other officer, within six months of its date, and pay the like sum (40*l.*) for every six months that the inrolment was delayed.

[Printed, 4*d.*]

A.D. 1636, April 22.—N° 91.

VERNATT, Sir PHILLIBERT.—" A sure, safe, and readie way " for the makeinge, melting, or smelting, casting, founding, " ꝑduceing, fineing, nealinge, beating, and workeing of iron, " steele, brasse, copper, tynne, leade, and all other kind of oare- " mettle and mettalique concocc̃ons, and for casting of ordinance, " and doeing all other workes of like nature vpon an hearth or " furnace aꝑted for that purpose with fire of sea coale, pitt coale, " or stone cole, and of as good condic̃on as the same have been " heretofore made and done with charcoale, and yet without " mixeing the same with or charking the saide sea cole, pitt coale, " or stone coale, which thing howsoever some have heretofore " vndertaken to doe, yet was never brought to ꝑfecc̃on, or used " within any of our domynions." The invention consisted in employing sea coal, pitt coal, or stone coal separately or combined with other fuel, wood only being excepted, and in working the various metals and combinations contained in the title. The patentee was bound to pay 5*s.* per ton, or a tenth part of his gross profits, as royalty to the king (Charles I). He had power, with the assistance of a constable or lawful officer, to enter upon and search premises where there was ground for suspecting that the invention was infringed; and all buildings where such infringement was found to be carried on, were to be pulled down and destroyed.

[Printed, 4*d.*]

A.D. 1636, January 21.—N° 96.

DANBY, GEORGE.—" A new invenc̃on for makeing hard iron " softe, and copper tuffe and softe." The invention relates to a mode of melting and casting copper into ingotts, and drawing the same. The patentee was to have the exclusive right of drawing, and covenanted to charge only the price " as nowe is usually

paied," eight pence per pound, and to pay yearly 10 pounde to the king (Charles I). A previous grant made to George Danby and David Ramsey of Letters Patent for an invention relating to the same subject was surrendered and cancelled. The grant was not to extend to restrain "the importaĉon of copper bricks or plates " of Hungarie, or any other copper whatsoever, copper ingots only " excepted."

[Printed, 3*d*.]

A.D. 1637, July 28.—N° 108.

WHITMORE, CAPTEN THO.—"The waies and meanes of " making vitrioll out of copper oare, and of ꝑparing copper oare " and drawing water from the same, soe as by the use of y^e^ water " to make copper out of iron, and likewise of ꝑparing of any " manner of oare, soe as by water to sepate the silver from the " said oare without melting the same."

[Printed, 3*d*.]

A.D. 1638, May 2.—N° 117.

HORSEY, Sir GEORGE; RAMSEY, DAVID; FOULKE, ROGER; and DUDLEY, DUDD.—" The makeing of iron with sea or pitt " coale, peate, or turffe, as abovesaid, and with the same to rost, " melt, or refyne all mettall of what nature soever." The invention relates to the employment of coal peat and turfe for fuel, which is said to have been effected "with bellowes, winde blast, " and additaments." After the first two years the sum of a hundred marks per annum was to be paid to the king (Charles I).

The patentees obtained also the privilege of opening and working mines of gold, silver, lead, tin, copper, and other metals for 21 years, paying a tenth of the proceeds to the king. The grant of Letters Patent was to be inrolled before the Clerke of the Pipe within six months, or a penalty of 20*l*. was to be paid for every six months the inrolment was delayed.

[Printed, 5*d*.]

A.D. 1638, June 18.—N° 119.

WAGONER, FREDERICKE.—"A newe waye for smelting of " leade oare after a more easier way, and with saving much of the " fewell now vsed thereabout by meanes of a furnace or oven

" invented by him, whereby it may be donne with a little quantity " of wood or turfe only." The invention related to a particular construction of furnace for melting lead. The patentee was bound to pay yearly 10 pounde to the king (Charles I.)

[Printed, 3*d.*]

A.D. 1660, July 23.—N° 129.

FRANK, Thornes.—"New setting or hanging of brewing fur- " naces, and all other boyling furnaces whatsoever, to the saveing " of fewell, and lessening of the great annoyance of smoake, and " likewise of building of furnaces his owne way for the melting or " smelting downe of all manner of mettalls out of their oares." The invention probably related to improvements on the construction of a furnace for which former Letters Patent were obtained in 1635 (See Patent No. 83, *ante*, p. 2). The object was to save fuel and consume smoke. The patentee covenanted to pay a tenth of the profits arising from his invention to the king (Charles I).

[Printed, 4*d.*]

A.D. 1664, April 22.—N° 145.

HENSHAW, Thomas; WATSON, Francis; HALE, Thomas; and DEWEY, James.—"A way, by the addic̃on and " mixing of chargeable ingredients, to make a valuable mettall " for divers sorts of vessells and vtensells," &c. The invention relates to the use of "a stone or minerall" made by the " addic̃on and mixing of ingredients into valuable metall for " the makeing of divers sorts of vessells and utensills." The metal produced was an alloy resembling silver.

[Printed, 3*d.*]

A.D. 1673, May 30.—N° 170.

SLANNING, Sir Nicholas.—"A much cheaper and more " excellent way then hath hitherto bin vsed or put in practice by " any for the melting, casting, refining, and forging of iron and " other mettall with turff and peate charked," &c. This invention probably referred to a particular kind of furnace of which no description was given.

[Printed 3*d.*]

A.D. 1673, November 12.—N° 171.

CHAMBERLAINE, William.—"A newe arte, mistery, or in- "venčon of greate vse," &c., "for plateing and tynning of iron, "copper, steele, and brasse, as alsoe for the compressing and "plateing of all other mettalls." The invention related to the use of certain "engines or instruments, and wayes and means" of tinning and plating iron, copper, steel, and brasse, and compressing those and other metals into various shapes.

[Printed, 4*d.*]

A.D. 1676, December 8.—N° 192.

HUTCHINSON, Samuell.—"A newe way of melting downe "leade oare into good and mallyable leade, and other mettall "and minerall into good and mallyable mettalls," &c. The invention referred to a method of melting lead, and certaine engines, instruments, and apparatus "relatinge thereunto," of which no description is given.

[Printed, 3*d.*]

A.D. 1677, October 25.—N° 198.

BLEWSTONE, Fredericke de.—"A new & effectuall way "of melting downe, forgeing, extracting, & reduceing of iron "& all mettalls & mineralls with pitt coale & sea coale," &c. The invention appears to relate to certain "forges, furnaces, "instruments, and other materialls," of which no description is given.

[Printed, 4*d.*]

A.D. 1678, November 12.—N° 206.

GRANDISON, George Lord Viscount.—"To melt and refine "lead oare in close or reverberatory furnaces with pitt coale or "sea coale, turfe, peate, or other mixt fuell," &c. The invention relates to a construction of furnace, of which no description is given.

[Printed, 3*d.*]

A.D. 1684, August 28.—N° 239.

HOWARD, Henry, and BRETT, Richard.—"Melting or "smelting of copper oare and tinn oare with sea coale or pitt

" coale," &c. The invention relates to a mode of constructing and working furnaces of which no details are given.

[Printed, 4*d.*]

A.D. 1687, January 25.—N° 253.

CLERK, Sir ROBERT; BRENT, ROBERT; and CLERK, TALBOT.—" A new invention, being severall sorts of furnaces, " vessells, wayes, and meanes that never before were knowne, for " the cheaper extracting all mettalline bodies, perticulerly gold, " silver, copper, lead, and tinn, out of their oares or minerals," &c. The invention related to furnaces and apparatus for extracting various metals from the ores containing them in combination; also to modes of refining and separating the more precious from the baser metals. The patentees were bound to pay to the king (James II.) one half of the profits which should accrue from the invention after the first six years of the term of the patent had passed.

[Printed, 4*d.*]

A.D. 1688, September 8.—N° 260.

STRODE, BERNARD, and SNELLING, ROBERT.—" A com- " pound metall which drawes soe fine as that it will spin and " weave into all sorts of stuffs, and is also fitt for severall other " vses." The invention related to a compound metal or alloy that was capable of being drawn out into very fine wire or threads. No particulars of the ingredients or process employed are given.

[Printed, 3*d.*]

A.D. 1690, June 26.—N° 264.

HODGES, JOHN.—" A way for melting and refineing lead ore " in close or reverberatory furnaces," &c. The invention relates to a method of melting and refining lead with pitt coal, turf, or peat. The particulars of the process and apparatus employed are not given. The grant of Letters Patent extended only to Ireland.

[Printed, 3*d.*]

A.D. 1691, August 22.—N° 271.

TIZACK, JOHN.—" A way by an engine to be worked by one or " more men for the well and more easy oyling and dressing of leather

" and cloath," crushing ores and minerals, &c. The invention relates to an engine or apparatus which may be used for dressing leather, fulling cloth, also for crushing ores and raising water, washing clothes, pounding and making raggs fit for paper, &c. The grant of Letters Patent extended to the colonies and the plantations in America.

[Printed, 3*d.*]

A.D. 1691, September 5.—N° 273.

NEALE, THOMAS, Esq.—" Makeing of brasse, and thereof plates " for kettles," &c. The invention relates to a method of making brasse and forming plates of brass into kettles and other hollow vessels. No particular description is given of the process employed.

[Printed, 3*d.*]

A.D. 1691, December 7.—N° 285.

STAPLETON, JOHN.—" Art of makeing by way of translocaĉon " a fine mettall, both white and yellow, knowne by the name of " the Nuremburgh mettall," &c. The invention relates to the manufacture of alloys resembling gold and silver. The particular metals and process employed are not described.

[Printed. 3*d.*]

A.D. 1692, January 22.—N° 288.

MORTON, CHARLES, and WEALE, SAMUELL.—" A new ma- " chine or engine vsefull for beating, pounding, or stamping all " sorts of minerall oares," &c. The invention relates to apparatus for stamping and crushing ores, and for drawing up ores from mines. No particulars are given.

[Printed, 3*d.*]

A.D. 1693, January 17.—N° 311.

NATION, GEORGE; DEWEE, JOHN; and PUCKLE, THOMAS. —" In contriveing and engine consisting of screw wheeles, long tumblers," &c. for " pounding and grinding of metalls or other " hard substances." The invention relates to lifting and stamping apparatus for crushing ores, &c., of which the particulars are not described.

[Printed, 3*d.*]

A.D. 1694, April 27.—N° 334.

WATKINS, JOHN.—"A way for smelting or melting downe all "sorte of tinn," &c. The invention relates to a method of smelting tin ores with ordinary coal. No particular description is given of the details or apparatus employed.

[Printed, 3*d.*]

A.D. 1697, September 4.—N° 351.

LYDALL, ROBERT.—"New way of separateing silver from lead, "and makeing litharidge and redd lead of the lead," &c. The invention relates to a process of reducing and refining lead ores containing silver, and of separating the metals in a closed furnace; also to making red lead with sea coal for fuel. The furnace and process used are not described.

[Printed, 3*d.*]

A.D. 1699, May 11.—N° 363.

HILL, JOHN, and HILL, OLIVER.—"A very beneficiall way of "melting oares after the Hungarian manner," &c. The invention relates to smelting ores. The construction of the furnace used is not described.

[Printed, 3*d.*]

A.D. 1702, June 13.—N° 368.

LYDALL, ROBERT.—"A new way of smelting and melting "black tinn into good merchantable white tinn," &c. The invention relates to a mode of smelting black tin and producing white tin in reverberatory furnaces, by the aid of certain fluxes and ingredients, which are not specified.

[Printed, 3*d.*]

A.D. 1705, July 23.—N° 374.

LYDDALL, ROBERT.—"A new art, method or invencon of "separating and refining gold and silver from tynn by pre-"cipitacon, and likewise for melting and smelting black tynn car "into good merchantable white tynn with culm and sea coal," &c. The process of precipitation is proposed to be used in treating and

reducing tin ores, and separating the precious from the baser metals contained therein. Black tin ores are smelted in a blast furnace, and are converted into white tin. No details are given of the process and apparatus employed.

[Printed, 3*d*.]

A.D. 1716, June 30.—N° 406.

MOULT, FRANCIS.—"A new way of fluxing, seperating, and "reducing black tin into good merchantable white tin," &c. Alkaline and saline mixtures are used in fluxing, reducing, and separating tin ores. The ingredients composing the mixtures are not specified.

[Printed, 3*d*.]

A.D. 1722, April 21.—N° 443.

MOORE, GEORGE.—"A new method of refining copper on the "test by air and blast," &c. Copper is proposed to be refined and purified at a single operation in air or blast or other proper furnaces which are not described. The Letters Patent contain a clause making the grant void if it should become vested in or held in trust for more than five persons. This is one of the earliest instances of the insertion of such a clause.

[Printed, 4*d*.]

A.D. 1728, February 3.—N° 495.

LUND, BENJAMIN, and HAWKSBEE, FRANCIS.—"A method "for the more advantageous manufacturing copper oares through "all the intermediate operations till it be brought into fine "copper, and from thence into brasse, to be cast into plates, ingotts, "rodds, kettles, and other utensills in mettall moulds," &c. The copper ore is calcined in a close furnace, and the volatile sulphur is discharged and forced into a receiver annexed thereto. The heated ore is withdrawn from the furnace and "immersed into a "fluid or lixivium," it is next dried and put into the furnace, and melted, and afterwards run out into a mould; when cool, the "regule or finer part is separated from the coarser part, and "the regule is again calcined and remelted" until the copper is "brought to a proper standard for separating the silver

" therefrom," or becomes fine copper. Lead in the form of ore or other form is used for separating silver from copper. The lead ore is calcined in the close furnace and refined, and is added in proper proportions to the fused copper. The mixture is run into a conical mould, and the lead is separated from the copper at the bottom of the cone and is taken off. The lumps of copper and lead are remelted in a furnace, and the lead is drawn off, and when rich enough is separated from the silver in the usual way.

" Copper, calamy, and charcoal " are used for making brass. The " calamy " is calcined in a close furnace which may be divided into compartments and be provided with suitable flues and condensers. The calamy and charcoal are mixed in a cylinder in which revolves an axis carrying arms, into this the melted brass or copper is run, and the whole is well mixed, and then the mixture is put in an air furnace of a paraboloid shape, with a fixed bottom, and is heated and converted into brass. The melted brass may be cast in the shapes required by using suitable metal moulds, which should be heated. The current in the flue or chimney of the furnace may be used to give motion to a wheel, and stampers or crushers for breaking the ore.

[Printed, *4d.* See Rolls Reports, 6th Report, p. 118.]

A.D. 1730, December 7.—N° 524.

ROBERTS, George.—" An art or method for improving, gra-" duating, and better perfecting metals and their oares," &c. The invention relates to a mode of separating silver from lead and other ores, by the use of prepared salts, sulphurs, and other ingredients which are not specified.

[Printed, *4d.*]

A.D. 1731, October 8.—N° 532.

COPPIN, Elizabeth.—" An art of fluxing and fixing mun-" dick," &c. The " sulphurous and volatile mineral," mundic, " hitherto considered as a crude oar or marchasite," is fluxed and fixed into a metal, and silver is extracted from it. No details are given of the process employed.

[Printed, *4d.*]

A.D. 1739, September 13.—N° 569.

CHAMPION, John.—"A new invention for making tough and "brittle mettalls from sulphureous mineralls, and compounding "the same with other mettalls." A tough "or a short brittle "white mettall is produced by melting once or oftener as re-"quired antimony oar" or "crude antimony with the proper "flux or fluxes" (which are not stated.)

By melting "white or yellow arsnick," together or separate, once or oftener as required, with proper fluxes, a white metall is produced.

By melting these tough or brittle metals at a proper heat with proper fluxes, they can be united or compounded with copper, brass, tin, iron, or lead.

[Printed, 3*d.*]

A.D. 1749, July 1.—N° 646.

MOORE, Mathew, and STARK, Charles Sigismund.—"A chemical composition of metal," &c. The composition of the metal is said to be suitable for cannon and fire-arms, also for the manufacture of certain utensils. The details of the composition are not specified.

[Printed, 4*d.*]

A.D. 1749, December 13.—N° 651.

CREED, Sir James.—"A method or way of making white lead; "and also of casting lead, which is to be used for milling for the "covering of churches, houses, and other buildings." The lead is cast in sheets on a bed of metal; the thickness is "deter-"mined by a strike," as in casting lead on a bed of sand. The metal bed should be "nealed."

[Printed, 3*d.* See Rolls Chapel Reports, 6th Report, p. 124.]

A.D. 1757, February 9.—N° 711.

MORRIS, Robert.—"New invented method of fashioning and "colouring copper in imitation of Japan copper." The copper is made from British ore and purified in the usual way. It is then melted and "run into small moulds, which are fixed in a

" machine, which keeps them moving in an horizontal circle " under water," tempered " to the proper degree of heat." When the " copper is sett " it becomes of a fine vermilion colour like the Japan copper.

[Printed, 3*d*.]

A.D. 1757, July 13.—N° 715.

ROWE, JOHN.—" A mill upon a method entirely new, and of " my own invention, for the grinding all sorts of mineral oars," &c. The mill is provided with grinding stones, inlaid with iron and faced with steel. A sieve is used for sifting and sorting the ores, to which a quick motion is given by suitable apparatus.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 129.]

A.D. 1758, July 28.—N° 726.

CHAMPION, JOHN.—" Spelter and brass might be made from " a mineral which had not thentofore been made use of for such " purposes." The mineral called " black jack," or " mock jack," or " brazill," a red stone, is washed, purified, ground fine, and calcined; it may then be mixed with charcoal and be made into spelter, or it may be mixed with charcoal and copper, and heated, and converted into brass.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 129.]

A.D. 1758, December 21.—N° 732.

POOLE, JAMES, and RINGSTED, WILLIAM.—" Method of " making coaches," &c., " and covering the same on the outside " with copper, iron, or brass, beautifully enamelled with gold, " or without, instead of leather," &c. Plates of copper, iron, or brass are planished and varnished, and ornamented with gilding. They are then inlaid in or attached to the panels they are intended to ornament.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 129.]

A.D. 1759, July 14.—N° 740.

BLOCKLEY, THOMAS.—" New methods of polishing and " rolling into different forms all malliable metal," &c. The rolls are to be turned and formed of the requisite shape, so as to shape

the article as intended. Tyres are formed by hammering them in a hollow anvil.

[Printed, 3d. See Rolls Chapel Reports, 6th Report, p. 130.]

A.D. 1762, January 25.—N° 767.

WHITE, William.—"New invented manufacture of crucibles "for the melting metals and salts," &c. The specification says, "Take Sturtridge clay and Dorsetshire clay, mix them with "Woolwich sand and water; to be trodden with the feet and then "burned."

[Printed, 3d.]

A.D. 1762, May 21.—N° 774.

SWAINE, Sampson.—"New method of constructing and "adapting to each other a machine furnace and fire engine, so "that the same fire should at the same time be capable of smelting "and refining several sorts of metals," &c. A simple or compound furnace is used; it is divided in compartments for smelting tin, copper, and other ores and metals. A boiler is made to surround the furnace, the steam of which is applied to work a fire engine and stamping apparatus.

[Printed, 3d. See Rolls Chapel Reports, 6th Report, p. 158.]

A.D. 1762, December 13.—N° 783.

KNIGHT, James.—"A new method of making and drawing "iron and other metals," &c. Blowing apparatus is described; also a screw and slitting press for compressing and cutting up blooms. Forging apparatus is described, and an air furnace "working only by a draft" is employed.

[Printed, 4d. See Rolls Chapel Reports, 6th Report, p. 132.]

A.D. 1763, June 16.—N° 790.

KEENE, Benjamin, and SCHMIDT, Carl Friedrich.—"A "composition and varnish entirely new, made with oils and "various other things, for staining, printing, or painting and "laying gold, silver, or metall on woollens, worsteds," &c. The specification gives a receipt for forming a composition of oils,

spirits, and various gums and other numerous ingredients, which may be combined with metals, and be applied to threads and fabrics.

[Printed, 3*d.*]

A.D. 1764, December 5.—N° 821.

WILLIAMSON, James, and SPACKMAN, Joseph.—" A new " method of turning ovals in pewter," &c. The specification and drawings describe a lathe suitable for turning ovals in pewter and other materials; also for making china and earthenwares vessels.

[Printed, 5*d.* See Rolls Chapel Reports, 6th Report, p. 133.]

A.D. 1767, January 26.—N° 867.

CHAMPION, William.—" The art or mystery of refining " copper for making brass by wrought iron, and of making brass " by a mineral called black jack or brazil instead of calamy or " lapis calaminaris, and for manufacturing brass into brass wire " by stone or pit coal instead of wood now used." Copper for making brass is refined "with wrought iron intermixed or thrown " into it." This extracts the "pernicious arsenical" qualities of the copper. "Black jack" or "brazil" is used instead of calamy or lapis calaminaris for "making better brass at less expense." Stone or pit coal may be used instead of wood.

[Printed, 3*d.* See Rolls Chapel Reports, 6th Report, p. 159.]

A.D. 1768, March 8.—N° 894.

COX, Robert Albion.—"New invented method of smelting " and refining of gold, silver, copper, lead, and its ores, and the " waste and sweepings thereof, with the foul slaggs drawn there- " from, by means of a new and particular method of grinding, " washing, and working the same, and constructing the smelting " and testing furnaces." The specification and drawings describe modes of reducing and refining and separating ores containing mixed metals, precious and base, and the furnaces and apparatus used in the various processes. The slags and scoria and metallic bodies are roasted or smelted with sea salt or other coarse salt. " Lead or litharge of lead" is used "to force precipitation." The mode of treating the regulus and separating the metals is fully described, and also grinding and crushing apparatus.

[Printed, 10*d.* See Rolls Chapel Reports, 6th Report, p. 160.]

A.D. 1768, August 13.—N° 901.

BOOTIE, John.—"Tinning, selling, and vending such copper "and brass vessells (that is to say), ship kettles and kitchen "furniture, after my new invention." Copper and brass vessels are cleaned and washed over "with salarmoniack water." "Pure "tinn" only is to be used, "and wiped off clean." When "cold, "it must be covered over with wet whiting, and the other side "with strong beef brine, and made red hot, and quenched in "water,"—scoured clean. The surface is then tinned, then planished, then tinned a third time, "then filled with water to "soke and take out the salts, and then scoured with common "sand."

[Printed, 5*d.* See Rolls Chapel Reports, 6th Report, p. 160.]

A.D. 1768, November 8.—N° 905.

WHATELEY, George.—"Method of plating silver upon mettal "wire and drawing the same into wire of very fine sizes," also "plating gold upon silver wire, and drawing the same into wire of "the finest sizes," &c. Copper or other metal wire is drawn in the usual way; a strip of silver is then folded round it, and united thereto with borax. The wire thus coated is afterwards drawn. Silver wire is covered with a layer of gold, and drawn in a similar way.

[Printed, 4*d.* See Rolls Chapel Reports, 6th Report, p. 136.]

A.D. 1768, December 6.—N° 908.

WHATELEY, George.—"New invented method of plating "gold upon silver-plated metal wire, and of drawing such wire "when plated with gold into wire of very fine sizes." Wire is first plated with silver in the usual way, and then the silver-plated wire is coated with a thin coating of pure gold, and drawn through a draw plate to the required fineness.

[Printed, 4*d.* See Rolls Chapel Reports, 6th Report, p. 136.]

A.D. 1769, May 5.—N° 919.

BONNIN, Gousse.—"A particular method of manufacturing "certain materials found out and discovered by me into crucibles,"

&c. Clay of a particular kind found near Philadelphia in the United States is cleansed and mixed with equal proportions of black lead. The crucibles so made are said to be of a most superior quality.

[Printed, 0*d.*]

A.D. 1769, March 7.—N° 920.

PICKERING, JOHN.—" A new method of performing that kind " of work comonly called chasing, for the working in gold, silver, " brass, tin, and other metals," &c. The work is performed by means of stamping or pressing apparatus, which by means of suitable dies forms the required figures on the surface of the metals.

[Printed, 3*d.*]

A.D. 1769, August 28.—N° 935.

FORD, RICHARD.—" Rolling silver, copper, and other metals of " various thicknesses with the same rollers by one operation, and " of drawing brass, iron, steel, and other wire by wheels," &c. Two, three, or more rollers are employed. Drawing apparatus is described, also a stamping machine and suitable dies.

[Printed, 3*d.*]

A.D. 1770, August 10.—N° 967.

CRAWFORD, MAURICE.—" New-invented method of tinning of " copper," &c. The copper is wrought and pickled in the common way; " it is freezed in the inside upon stakes cut as " rough as a course file, or any other method of freezing which " opens the pores of the copper and makes the tinning penetrate." The copper is afterwards again pickled and scoured. It is then tinned with sal ammoniac and grain tin, and afterwards with a mixture thus formed:—Grain tin 1 lb., zinc or spelter 1½ lbs. The surface is afterwards rubbed with chalk and water and planished.

[Printed, 3*d.* See Repertory of Arts, vol. 10, p. 397.]

A.D. 1772, April 3.—N° 1010.

HOMER, MARK.—" A great or stove with its appurtenances " made of metal, plated with silver," &c. Iron or copper, or a

mixture of copper and brass, is coated with fine silver, and then hammered or rolled or stamped into the required forms. Ornaments of enamel or lapis lazuli are added subsequently.

[Printed, 3*d.*]

A.D. 1773, April 21.—N° 1041.

BARBER, John.—"A machine with the apparatus thereunto "belonging which by fire, water, air, and steam will purify fossil "coal, extract metals from their ores and collect their ores, and "collect their particles when volatilized by heat." The specification is illustrated by curious drawings which should be referred to. A steam-engine is described and a furnace for smelting ores. Over the furnace is placed the boiler, and gases and steam and air are driven from the boiler into the furnace among the fuel and melting ores.

[Printed, 6*d.* See Rolls Chapel Reports, 6th Report, p. 139.]

A.D. 1773, November 15.—N° 1055.

DOVEY, Richard.—"Making a metal of the colour and in all "respects resembling gold." Take of copper 1½ oz., of grain tin 2 pennyweights 4½ grains; of zinc or spelter 2 pennyweights ¾ of a grain; of antimony ½ grain; of red lead ½ grain; man- "gonize oar ½ grain; crocus martus oar ½ grain." Melt the copper in a black-lead pot in an air furnace, then put in the tin; this hardens the copper; heat it for half an hour to purify it, then put in the zinc to give it a yellow tinge, about 10 minutes afterwards throw in the antimony and other ingredients described, which should be wrapped in paper, continue the mixture in the pot for five minutes, then run it off into ingots.

[Printed, 3*d.*]

A.D. 1774, April 11.—N° 1067.

GIFFIN, Thomas.—"An entirely new method of manufacturing "tin foil," &c. The apparatus used is described by means of drawings with explanatory references. These show a windmill, which sets in motion suitable hammers and stamping and rolling apparatus, which appear to work in combination.

[Printed, 9*d.*]

A.D. 1774, April 14.—N° 1068.

STORER, William.—"Making, chasing, or embossing in lead," ornaments, "rendered as durable as if made in copper or other "metal." Lead of the purest and softest quality is melted and run into moulds which are made of clay and red lead, "braided together "with weak glue size" worked to the consistency of putty. A fine impression may be given to the mixture by pressing with a model of the required form. The lead is poured into the impression, and then poured out, leaving a coating adhering thereto "a "little thicker than hot-pressers' paper." Ornamental designs are then pressed or chased in the lead, and the back is afterwards filled up with hard solder. The lead may be afterwards gilded or painted or varnished.

[Printed, 3*d*.]

A.D. 1774, October 27.—N° 1084.

SANDERSON, Matthew.—"Precipitating and smelting, re-"fining and separating, metallic earths or clays, and poor flinty, "sulphureous, and stubborn ores of lead and copper, and slagg."

Argillaceous and calcareous or other earthy substances are mixed with "perfectly depurated slagg of lead," metallic clays, and cuprous ores in suitable proportions. The mixture is melted with fuel in a blast furnace, and the fluid regulus is drawn off from below and treated in the usual way.

[Printed, 4*d*.]

A.D. 1774, December 14.—N° 1091.

UNDERWOOD, Francis.—"Casting and working into frames, "of any figure or size," &c. "a compound which will in every "respect answer the purpose of wood, iron, brass, or copper." The composition used is block or grain tin melted with lead in such proportions as to give the requisite degree of hardness. The bars or mouldings for window frames are cast solid in moulds of brass or stone.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 162.]

A.D. 1777, March 6.—N° 1148.

WILLIAMS, William.—"A composition of gold, silver, and "metal for making coat and waistcoat buttons entirely new," &c.

Copper or brass are used, melted together or separate, for forming buttons. The surface of the copper is plated with silver, which is then gilt; portions of the gilding are scraped off, so as to form various patterns.

[Printed, 3*d.*]

A.D. 1777, June 10.—N° 1157.

THOMAS, Francis.—" A new machine for separating all kinds " of metals from slaggs." The drawings and descriptions appended to them describe a mill for crushing ores. Apparatus of the ordinary construction as used for sifting the crushed ores, and washing and separating the metallic particles, is also described.

[Printed, 9*d.*]

A.D. 1778, March 16, N° 1185.

COOK, Henry.—"An intire new composition, to be used as a " substitute for and will in every respect be preferable to either " lead, slates, or tiles," &c. Litharge, red or white lead, and pulverised siliceous or vitreous matters are pulverised and mixed together. Rope or hempen fabrics reduced to a pulp are mixed therewith in water. The composition is pressed in moulds in the requisite forms.

[Printed, 3*d.*]

A.D. 1778, March 20.—N° 1187.

COLLINS, William.—" A method of preparing, gilding, polish- " ing, and burnishing a metal (or metals) plated with silver," &c. Gold is laid on silver plated on metals in a considerable thickness. The metals are then passed between rollers, one of which revolves at a quicker speed than the other; this is said to burnish and give a superior lustre to the gilded surface.

[Printed, 3*d.*]

A.D. 1778, March 30.—N° 1189.

HAWKINS, Edward.—"The art or method of making shaven " or bright latten." The invention is simply stated to consist in " rolling, battering, or hammering (and shaving for scraping) " sheet brass."

[Printed, 3*d.*]

A.D. 1778, May 7.—N° 1191.

WILLIAMS, Thomas.—" The sole smelting of copper ore " according to the method newly discovered by me." The molten copper (after undergoing the usual processes and the third skimming) is run into a cistern of water, instead of being tapped into a bed of sand. The granulated metal is afterwards remelted, and may be again granulated, and then refined in the usual way.

[Printed, 3*d.*]

A.D. 1778, June 3.—N° 1194.

TALBOT, John.—" New-invented machine or engine to be " used in the working of steel, iron, brass, or copper, hot or " cold," &c. The specification describes apparatus for " taking " the outer coat or crust off any sort of metal," by means of a large toothed wheel, or circular cutter, or circular file, mounted in suitable framing, to which are attached side rollers.

[Printed, 3*d.*]

A.D. 1778, December 21.—N° 1203.

SANDERSON, Matthew.—" New process for the extracting a " mineral sulphur from pyrites, copper and lead ores, separating " its acid," &c. Sulphurous pyrites, copper or lead ores are placed in a quadrangular pile " upon a bed of fuel placed upon air " pipes;" channels are formed in the pile leading downwards. The pile is covered with " antiphlogistic matter " to keep in the fumes. The pile is fired, and the fumes of the sulphur are collected by suitable pipes and condensed.

[Printed, 3*d.*]

A.D. 1779, January 30.—N° 1209.

ELLIS, Richard.—" New-invented method or mode of plating " steel or iron with gold or silver." The surfaces to be plated or gilt are rubbed with borax. The gold or silver is to be fitted close and soldered. The solders used may be as follows :—

1 oz. gold, 4 dwts. fine silver, 3 dwts. fine copper.

Or 1 oz. fine silver, 2 dwts. of spelter.

Or 1 oz. fine silver, 12 grains copper, brass, or spelter.

[Printed, 3*d.* See Rolls Chapel Reports, 6th Report, p. 164.]

A.D. 1779, March 22.—N° 1215.

BENNETT, THOMAS.—" Compound metal for lining copper, " brass, and iron vessells, so as to make them as sweet as if of " solid silver, and more durable than any other invention for that " purpose discovered." The compound metal is thus made:— Melt 2 lbs. of grain tin; then take 8 oz. of silver made very thin, when dipped in sal-ammoniac water, dry it, and put it in the melted tin. To apply the metal to vessels:—Clean them, wash them with sal-ammoniac water, dry them, and apply the metal with greater heat than is used in common tinning.

[Printed, 3*d*.]

A.D. 1779, March 27.—N° 1216.

ROE, WILLIAM.—" New process for calcining, of extracting the " sulphur from poor copper and lead ores," &c. Kilns of a circular, oblong, or quadrangular form are described. At the sides, ends, or round the kilns are arranged fireplaces, provided with suitable flues. The flame and heat are allowed to have direct and " free communication with the ores" to be calcined, the ores being retained by suitable bars or gratings.

[Printed, 3*d*. See Repertory of Arts, vol. 6, p. 386.]

A.D. 1779, November 24.—N° 1239.

CHAMPION, JOHN, senior.—" Making and vending brass and " spelter by a new method." Mix $\frac{4}{10}$ of granulated copper with $\frac{6}{10}$ of lapis calaminaris or prepared " black jack," and with a proper quantity of charcoal; put the mixture in large closed clay pots in a furnace, and melt with the necessary heat.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1779, December 10.—N° 1240.

KEIR, JAMES.—" A compound metal capable of being forged " when red hot or when cold, more fit for the making of bolts, " nails, and sheathing for ships than any metals heretofore used " or applied for those purposes, and also for various other pur- " poses where other metals have been used or applied." To make the compound metal combine together 100 parts of copper, 75 parts of zinc or spelter, and 10 parts of iron. First melt the iron

and copper together in the presence of charcoal, and pounded glass or other fluxes; then add the zinc by degrees.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1779, December 26.—No. 1242.

BELL, WILLIAM.—"A more speedy method of affixing impres-"sions from dies upon gold, silver, or mettals by means of rolling "cylanders," &c. Rolls or cylinders have the requisite designs sunk in their surfaces, and the metals are passed between them. Buckles, buttons, and similar articles may be thus made.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1780, February 5.—N° 1243.

SANDERSON, MATHEW.—"New process for extracting from "lead glitter, or blue stone, and iron ores, allum, sulphur, white "and green vitrials, and from copper ores, blue vitroil; refining "and seperating their metallic contents by a blast furnace," &c. Methods of treating sulphurous ores, and of collecting and condensing fumes of sulphur, are described. Vitriols are obtained by the usual processes. Calcined blend being cemented "with a "phlogistic matter, the semi-metallic matter called zinc is obtained, "which being combined by fusion" with granulated or precipitated copper, "a beautiful brass," resembling gold, is obtained. The deposits left in washing copper and iron ores may be used as pigments. Lead ores containing silver are mixed with layers of fuel, and melted in suitable furnaces. The silver and lead and other metallic substances are run out "into a propper bed or reservoir, "from whence it is taped, and there parted, and the operation "repeated as occasion requires. The metallic part left being "chiefly copper and iron is removed to another furnace; and "after separation of the iron, reduces to good and perfect copper. "The parcel of lead enriched with silver is committed to the test, "in order to separate the silver therein contained."

[Printed, 4*d*. See Rolls Chapel Reports, 6th Report, p. 165.]

A.D. 1780, April 7.—N° 1251.

ELWELL, JOHN.—"Making the several utensils and articles," &c. of pure "grain tin, with or without another metal," &c.

Pure grain tin metal is mixed with "additional mettal, which is "commonly known by the name of tooth and egg mettal, or "white copper, or any other hard mettal of any kind." The mixture is cast in moulds or shaped with the hammer or otherwise, as may be found convenient.

[Printed, 3*d.*]

A.D. 1780, June 12.—N° 1256.

DONNITHORNE, NICHOLAS; SHERSON, ROBERT; and SMITH, EDWARD.—"A new white composition called marine "metal, which will be found particularly useful for sheathing of "ships and other valuable purposes." "Take zinc (quantum "placet)," break it, and heat in a closed pan in a sand bath, without sublimation, cool the metal with strong lime water, 4 pints to the pound of zinc. This operation is repeated six times. The metal is then pulverised, mixed with lime water, and "of black soap 1 oz., "salt of zinc 1 drachm," to every pound of zinc, so as to form a paste. 10 lbs. of this mixture melted with 1 cwt. of tin will deprive it of the character which causes it to emit "a crackling noise" when beat.

[Printed, 3*d.* See Repertory of Arts, vol. 6, p. 308.]

A.D. 1781, July 13.—N° 1297.

EMERSON, JAMES.—"Making brass with copper and spelter." The spelter is granulated by melting it, and pouring it into water. Then 54 lbs. of granulated copper, 10 lbs. of pulverised calcined calamine, and a bushel of ground charcoal are mixed together. A handful of the mixture is put into the melting pot, then about 3 lbs. of "the sholed" or granulated spelter; the pot is then filled up with the mixture. Eight other pots are similarly charged, so that 54 lbs. of copper, 27 lbs. of sholed spelter, 10 lbs. of calamine, and a bushel of charcoal may charge 9 pots, and fill a furnace. They are heated for about 12 hours, and produce about 82 lbs. of brass.

[Printed, 3*d.* See Repertory of Arts, vol. 5, p. 24.]

A.D. 1782, January 14. —N° 1316.

MARTIN, JOSHUA LOVER.—"New-invented art of drawing tubes, "plated or otherwise covered with silver or gold on copper or

" other metal," &c. The copper or metals are first covered with gold or silver in the usual way, and then formed into tubes and soldered. The tubes are then drawn by a draw bench to the requisite sizes, and may be used for telescope tubes and other purposes.

[Printed, 3*d.*]

A.D. 1782, March 4.—N° 1319.

PARTRIDGE, John, the younger.—" A furnace of a new con-" struction, which may be either round, square, or of any other " shape on the inside, for the smelting and refining of tin from " the ore." The specification and drawings describe minutely a furnace for smelting tin, about 8 feet square and 19 feet high. Full particulars and dimensions are given to be used in constructing the "openings, the inside walls, the hearth, the boshes, the " dame stone, the dame plate, the overshot wheel, and the " bellows."

[Printed, 10*d.*]

A.D. 1783, April 28.—N° 1363.

CHASTEL, Charles Baron De.—" New-constructed machine " for seperating of gold and silver from earth, scoria, and impu-" ritys, by means of trituration, mercury, and amalgama." The specification and drawings describe a crushing mill, having circular rollers carried by arms attached to a vertical centre shaft. Pipes are used for carrying water to the crushed ores, and suitable apparatus, cisterns and channels are provided for washing the ores and drawing off the water, and separating the washed products, and also for applying the amalgamating process.

[Printed, 1*s* 10*d.*]

A.D. 1783, May 24.—N° 1375.

PLAYFAIR, William.—" Making bars for sash windows, of copper, iron, or any mixed metal containing copper." The bars of copper or other metals are passed through rollers, which are cut so as to produce a bar of the sectional shape required; or the bar may be drawn through suitably shaped holes. Bars of

copper plated with silver may be thus extended. Horse shoes may be made in a similar manner.

[Printed, 7*d*. See Repertory of Arts, vol. 8, p. 158.]

A.D. 1783, November 14.—N° 1398.

WESTWOOD, John.—"Hardening and stiffening copper, and "reducing the same from a large mass to any diameter not "exceeding five inches nor less than half an inch, either in round, "angular, indented, or oval forms, by the use of grooved or indented "rollers, and also for hardening and stiffening brass, iron, steel, "mixed and compound metals, which is or are of a texture that will "bear drawing or beating out by force, tilt, or hammer, either in "hot, warm, or cold state, by the same means." The specification and drawings describe rolling apparatus in which grooved rollers are used. The grooves form apertures gradually diminishing in size. The copper, brass, or other metals being made in bars of the right size, are passed through the grooves in succession until they are reduced to the size required.

[Printed, 5*d*.]

A.D. 1783, November 15.—N° 1400.

HORSLEY, John, the elder.—"A new method of making plated "furniture, &c." "Plates or leaves of silver are placed in the "moulds in which the furniture is to be cast, and then the moulds "are filled with a composition of melted tin and spelter, or any "other composition that will make tin hard."

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 160.]

A.D. 1785, February 26.—N° 1466.

PLAYFAIR, William.—"Certain new methods of making" buckles, &c., and "of covering the surfaces of copper or other "metals with silver, gold, or mixtures of silver or gold with other "metals." Rolling and stamping machines are used for making buckles in the ordinary way. The surfaces of copper and other metals are plated with different alloys of gold and silver, by inserting between the outer plate of alloy and the copper or other metal to be plated a thin sheet of silver alloyed with so much copper that it will melt sooner than either of the other

metals. The plates are fastened together by wire, heated and hammered or rolled in the usual way.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 171.]

A.D. 1785, June 14.—N° 1485.

WATT, James.—"Certain newly improved methods of con-" structing furnaces or fireplaces" for heating water, &c., and for "heating, melting, and smelting of metals and their ores," &c. The specification and drawings describe furnaces in which the smoke is consumed and the heat increased by "causing the smoke " and flame of the fresh fuel to pass through very hot funnels or " pipes, or among, through, or near fuel which is intensely hot, " and which has ceased to smoke," and in forcing the smoke and flame so heated, mixed with fresh air, among and over the heated contents of the furnace.

[Printed, 6*d*. See Repertory of Arts, vol. 4, p. 226; Engineers' and Mechanics' Encyclopædia, vol. 1, pp. 572 and 573; Register of Arts and Sciences, vol. 3 (*new series*), p. 137; Rolls Chapel Reports, 6th Report, p. 172.]

A.D. 1785, September 13.—N° 1496.

POULAIN, John.—" A new composition of tinning or lining of " all utensils or vessells made of copper, brass, iron, or other " metals," &c. The composition is formed of grained tin 7 lb., good malleable iron 1½ oz., platina 1 drachm, silver 1 dwt., gold 3 grains, fused in a crucible with 1 oz. of borax and 2 oz. glass pulverised. When fused the mixture is cast into ingots.

To apply the composition, heat it and pound it in a heated mortar, and melt it in a mould. Tin the vessel to which it is to be applied in the usual way, clean it, and apply one or more coats of the composition with sal ammoniac, by the method used in ordinary tinning.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 171.]

A.D. 1785, November 19.—N° 1511.

ALSTON, James.—"Lining, edging, plating, and covering, either " in the whole or in part, with silver or gold, or otherwise, buckles " and other articles made of iron, copper, or other metals or mixt " metals, by the use and application of tin or alloyed tin." The

specification describes minutely the process of making and plating buckles, as carried on at the date of the patent, and describes further thirteen improved processes invented by the patentee. These relate to "giving and preserving a durable covering of tin, "silver, or gold on the edges and bottoms" of buckles and other articles of copper or the baser metals and their alloys, when plated with gold or silver by means of tin solder. Also to rolls and presses to be used for stamping or impressing articles. Also to covering buttons made of iron with tin, silver, gold, or other metal, in the then usual way.

[Printed, 8*d*. See Rolls Chapel Reports, 6th Report, p. 172.]

A.D. 1786, March 4.—N° 1536.

BUTLER, JOHN.—"A new method of making bolts and brazier "or other rods of or from iron, copper, or brass, or iron shearings, "for ships," &c. The metal is piled or fagoted, and then passed through grooved rollers until it is reduced to the required size and shape.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 173.]

A.D. 1786, July 1.—N° 1549.

CHESTON, THOMAS.—"Making elastic spring buckles and "spurs in gold, silver, iron, steel, copper, pinchbeck, or other "mixed metals, to be plated with gold and silver." Gold, silver, or other metals or alloys are in the form of plates or bars passed through rollers, and made of the requisite shape. The metal is then heated and hardened by dipping it while hot into liquid, as oil, water, or other suitable liquids, mixed with salt. They are tempered by "blazing the oil, turpentine, or grease."

[Printed, 3*d*. See Repertory of Arts, vol. 5, p. 19; Rolls Chapel Reports, 6th Report, p. 175.]

A.D. 1787, October 30.—N° 1624.

ALSTON, JAMES.—"A new manner of making buttons of iron "or steel, covered with tin and other metal or tin alone." The surfaces of iron or steel being properly hardened and cleansed, are dipped into a solution of sal ammoniac, and drawn while wet through pounded rosin, and put in a cage or perforated box and

dipped in a bath of melted tin. They may be dipped in any other way, the surface of the tin being covered with fatty substance. For tinning, grain tin, tin alloyed with bismuth and best London pewter may be used.

[Printed, 3*d*. See Rolls Chapel Reports, 6th Report, p. 178.]

A.D. 1787, December 5.—N° 1633.

MATHER, HENRY, and FARRAND, ROGER.—" A new method " of gilding upon and ornamenting with leaf gold and leaf silver, " and with yellow leaf metal and white leaf metal, commonly " called Dutch leaf metal, all kind of goods," &c., and woven fabrics. " Oker, finely pounded," is mixed with oil varnish or linseed oil, or japanners' gold size, and the mixture is applied to the surface of the fabric in patterns. Gold or silver or other metallic leaf is laid thereon and passed through calender rollers. The surfaces are then dried and hardened, and the superfluous leaf is brushed off.

[Printed, 0*d*.]

A.D. 1788, March 4.—N° 1642.

GARDNER, ROBERT.—" A new and peculiar art or method of " manufacturing iron, copper, and other metals, by a new-invented " progressively multiplying air furnace." The specification and drawings describe a compound furnace for working metals; it is divided into compartments provided with regulators and dampers. The compartments are connected with, and heated by, a common furnace. The contents of the compartments are transferred from one to the other, according to the heat required for the various stages of the manufacture of the metals. Cast-iron floors are used. The waste heat may be employed to heat the boilers of steam-engines.

[Printed, 8*d*.]

A.D. 1788, August 12.—N° 1661.

BERNIE, SAMUEL.—" A method of preparing and restoring the " calx of lead after being used in extracting the mineral alkali " from common salt back into pig lead." Lead is put into a calcining furnace and calcined; the calx is melted; silver and lead

goes to the bottom, leaving calx at the top. The operation may be repeated until silver "is obtained at last pure." Or silver may be obtained by "cupellation or refining." The calx is afterwards mixed with one-sixteenth of its weight of lime and reduced in a furnace.

[Printed, 3d. See Repertory of Arts, vol. 5, p. 233.]

A.D. 1789, June 23.—N° 1689.

CONWAY, Henry Seymour.—"An entire new method of "adapting or conveying the heat arising from the fire of coal "employed in coke ovens (by a particular construction of such "ovens and flues adjoining thereto or connected therewith) for "the working of steam-engines, baking of bread, meat, or other "food, calcining and fusing of ores and metals, making of brass "or steel, as also for the purpose of warming of rooms, staircases, "or large buildings, heating water for baths," &c. The specification describes a furnace or oven wherein the fuel is spread "on a "flat or dead hearth, as is usual in coke ovens, and being sur-"rounded or covered over with an arch or crown of brickwork "formed so as well to contain and reverberate the heat." Proper openings are made "in the crown or search through which to "convey the flame and heat of the coal." The heat is conducted through suitably arranged flues, provided with registers or dampers to regulate the supply, round or through steam-boilers or into other furnaces where metals and compounds of metals may be heated, and melted and worked as required. One heating furnace may be thus made to supply heat to several furnaces or be applied for several purposes.

[Printed, 4d. See Repertory of Arts, vol. 3, p. 75; Rolls Chapel Reports, 6th Report, p. 180.]

A.D. 1790, March 31.—N° 1739.

COLLINS, William, and WYATT, Charles.—"A new article "of trade and commerce, being an improvement of copper sheets "or plates and brass sheets or plates, by covering and combining "them with a metallic or semi-metallic substance," &c. Sheets of copper or of alloys of copper and other metals are coated with lead or tin or their alloys, or with zinc, "or any other semi-metal "which may be proper for preventing the noxious effects arising

" from the use of the said sheets uncovered. The sheets are first " well cleansed by scouring or pickling them or by other methods. " The coating metal or mixtures must be melted in a suitable iron " or other vessel, so as to allow the sheets to be immersed therein. " Animal fat or other matter which will prevent the calcination " of the coating metals or mixtures, or the revival of its calx, is " kept constantly thereon, and added as required."

The coating substances, and the number of coatings required, will be regulated by the purposes to which the sheets are to be applied. In some cases lead alone is used, in others tin alone, in others lead first, and tin or lead and tin afterwards, in others mixtures of both at each operation, as 8 parts lead and 1 tin first, then equal parts of lead and tin, and so on. " Semi-metals also occasionally " form a part of the composition, either to increase its hardness or " its fusibility." To produce a succession of coatings, the sheets are repeatedly dipped in the mixtures, the heat being diminished as required. Sal ammoniac or other suitable fluxes may be used when the sheets do not take the coatings well. Those parts of the sheets which are not required to be coated may be defended by a layer of whiting and water, or other suitable substance. When requisite, plates or troughs or tables may be coated by pouring the melted substances upon them.

[Printed, 3*d.*]

A.D. 1790, July 8.—N° 1755.

WHITWORTH, John.—" Plating silver upon pure or block " tin," &c. A thin sheet of silver is placed in a mould of the required shape, and pressed exactly therein. Tin cut in small pieces with resin is placed on the silver and melted, and the silver adheres to the tin. In a similar manner gold may be plated on tin.

[Printed, 6*d.* See Rolls Chapel Reports, 6th Report, p. 144.]

A.D. 1790, July 8.—N° 1758.

WEARN, Roger.—" A certain new-invented method of heating " the boilers of steam-engines," &c., and also " by the fire used in " such boilers to calcine ores at the same time." The specification and drawings describe " an elliptical or arched furnace passing " through the middle of the boilers," and reverberating or return-

ing the fire or flame "upon the ores placed at the bottom of such "furnace," and thereby calcining them.

[Printed, 9*d*. See Rolls Chapel Reports, 6th Report, p. 183.]

A.D. 1791, May 11.—N° 1 05.

WYATT, CHARLES.—"Making pipes, spouts, troughs, and "cistern heads of materials not heretofore used and applied to "and for such purposes." Sheets of copper or brass or other alloy of copper are covered and combined with tin or lead or a semi-metal, or a compound of two or more of these substances. The sheets so covered are formed into pipes by turning them over a mandril, and soldering their edges together.

[Printed, 3*d*.]

A.D. 1791, October 31.—N° 1833.

BARBER, JOHN.—"A method of rising inflammable air, for the "purposes of procuring motion and facilitating metallurgical "operations." The specification and drawings describe an engine which is set in motion by the combustion of inflammable air or gas. The engine may be used for grinding and crushing ores, and rolling metals. Currents of inflammable gas and steam may be injected into furnaces for smelting metals.

[Printed, 9*d*. See Repertory of Arts, vol. 8, p. 371.]

A.D. 1792, March 2.—N° 1857.

WILKINSON, JOHN.—"An improved and expeditious method "of rolling or flatting of iron and other metals," &c. An alternating motion working in opposite directions is given to rolls used for rolling metals, instead of a rotative one. This is effected by means of a pair of steam cylinders, whose pistons are connected by a band or chain. The band passes over a pulley, fitted on one end of the axis of one of the rollers. The reciprocating action of the two pistons gives the required motion.

One piston and cylinder may be used: two chains or bands are connected to a rod at one end of the beam, one chain turns the roll pulley in one direction as the rod descends, and the other turns it in the opposite direction as the rod ascends.

[Printed, 6*d*.]

A.D. 1792, October 30.—N° 1915.

LUCAS, Edward.—"A method of fusing ores, metals, and "calx of metals, whereby a considerable saving is made in fuel "and labor." Furnaces are described having a fixed pot or pots, which may be heated by fuel placed around them, or by means of suitable flues. The ores are placed in the pots with suitable fluxes, and when melted are withdrawn by tapping suitable openings made in the lower part of the pots. The pots may then be recharged.

[Printed, 3*d*. See Repertory of Arts, vol. 8, p. 221.]

A.D. 1792, December 22.—N° 1928.

BARBER, John.—"A method for smelting and purifying fossil "coal, iron stone, iron ore, and other metallic ores, and the calx "thereof, by steam, air, and fire, and impregnating the same, "and the matrix thereof, with inflammable air, producing thereby "a tough metal." Iron or gold or platina, silver, copper, lead, or tin ores may be placed with fossil coal in a furnace, and steam with air is injected thereon through suitable pipes. Sal ammoniac or other menstruum may be mixed with the ores. The calx thus prepared may be afterwards smelted with coal, inflammable air or gas being injected into the furnace. Limestone, charcoal, and other materials may be used.

[Printed, 3*d*. See Repertory of Arts, vol. 8, p. 313.]

A.D. 1793, April 23.—N° 1951.

BENTHAM, Samuel.—"Various new and improved methods "and means of working wood, metal, and other materials." The specification describes a great variety of tools, as saws, lathes, boring apparatus, and screw-cutting apparatus, most of which are intended for working in wood; some are also applicable to working metals.

[Printed, 9¼*d*. See Repertory of Arts, vol. 10, pp. 221, 293, and 367; vol. 13, (*enlarged series*), p. 395.]

A.D. 1794, July 22.—N° 2002.

HAND, John.—"Plating cutlery" and steel surfaces. The surface of the steel is cleansed and pickled and scoured. It is

dipped into sal ammoniac and water (1 lb. to 2 quarts). It is next dusted with powdered rosin, and dipped into a bath of melted tin. It is afterwards again cleaned and dipped into sal ammoniac and water, dried with sawdust, and rubbed or filed smooth. A thin plate of silver is then laid thereon, and by pressure between suitable heated surfaces, the plate is soldered to the steel.

[Printed, 5*d.*]

A.D. 1794, August 29.—N° 2009.

KEMP, MATTHEW.—"Mill and apparatus for grinding," &c., also for "washing or sepperating emery, white lead, colours, and "ores." The specification and drawings describe grinding and polishing apparatus; also cisterns, cylinders, and troughs for washing and separating ores and other substances.

[Printed, 10*d.* See Rolls Chapel Reports, 6th Report, p. 188.]

A.D. 1797, July 4.—N° 2182.

HARRIS, TIMOTHY.—"A new method of manufacturing pins "with iron and other materials, and making the same white." Brass or iron or other wire is cut into lengths, and pointed in the usual way adopted in making pins. The heads may be cast on and be made of lead, tin, or pewter, or other metals or alloys. Lead with one tenth regulus of antimony is preferred. The pins are whitened by scouring and pickling them in suitable acids. About 25 lbs. weight of pins are put into a scouring barrel "with 50 lbs. "of small grain tin, 6 oz. of red argol, and 3 gallons of warm "water." They are then dipped in a solution of "blue vitrial," and whitened by again coating them with grain tin.

[Printed, 10*d.* See Repertory of Arts, vol. 13, p. 217. Rolls Chapel Reports, 6th Report, p. 194.]

A.D. 1798, June 14.—N° 2244.

HAZLEDINE, JOHN.—"A certain new way and method of "reducing and forming of large pigs, and pieces of iron, copper, "brass, and other metals into bars, plates, and hoops of diffe-"rent breadths, thickness, sizes, and shapes, as occasion might "require, by two, three, or more pairs of iron or other rollers, "without returning the same metal to be fed into and passed

"a second time through the first pair of rollers, and that by certain trough, conducter, or guide erected, made, or constructed, fixed, and fastened for the purpose of conducting and feeding the metal from one pair of rollers to another pair of rollers, and by so putting, and placing, erecting, fixing, and fastening the said rollers, and the said trough, conductor, or guide, as that one pair of rollers shall be fed with the metal from another pair, whereby a great saving of labour and expence would accrue." The specification and drawings describe a series of two or more pairs of rollers, provided with regulating screws, or other apparatus for increasing or diminishing the distance between the rollers. Guides or troughs are connected with the rollers to assist in delivering the metal to be rolled, which is passed from the first to the other rollers in succession, as may be required.

[Printed, 1s. See Roll's Chapel Reports, 6th Report, p. 195.]

A.D. 1798, October 10.—N° 2262.

GRENFELL, JOHN.—"New mode of applying machinery in manufacturing copper and tin plate vessels of every description." Tilt or trip hammers are used for hammering copper and tin plate vessels. A machine, consisting of a pole suspended like an ancient battering-ram, is also used for shaping or stamping the plates.

[Printed, 3*d.*]

A.D. 1799, January 16.—N° 2287.

EDGELL, JAMES.—"The use and application of metal of a peculiar quality and great strength, in the place, room, and stead of common iron," &c.—"The said metal is composed of bars, plates, rods, straps, or pieces of steel," which are fagotted, welded, and forged by means of a "forge, furnace, hammer, or mill," and drawn or hammered down into bars, plates, or rods; the metal is thereby rendered tough, strong, and free from flaws, and may be used of smaller size and less weight than common iron.

[Printed, 3d. See Repertory of Arts, vol. 11, p. 157.]

A.D. 1799, February 28.—N° 2296.

HICKLING, SAMUEL SANDY.—"Invention of a method or methods of improving and beautifying certain vessels." Vessels

of iron or other metals are lined with vitreous compounds applied in a heated state to their inside surfaces. Various ingredients are used for making the vitreous compound, as 6 parts calcined flint, 2 parts of white granite or china stone, 9 parts of litharge, 6 parts of borax, 1 part of argillaceous earth, 1 part of nitre, 6 parts of calx of tin, and 1 part of purified potash, these materials are pulverised, well mixed, and fused in a crucible. Other similar ingredients are mentioned, which may be used in slightly varying proportion. Hollow vessels may also be made of cast iron alloyed with nickel—from 40 to 4 parts of iron, with 1 part of nickel. The vessel is lined with copper by the precipitation process; a nitrous solution of copper is used by preference. The copper lining is converted into brass by applying thereto an amalgan, consisting of 12 parts of zinc and 5 parts of quicksilver, "in the same way " that gilders practice." The vessels so coated are washed and exposed to heat, which drives off the mercury, leaving the zinc combined with the copper, and so forming brass.

[Printed, 4*d*. See Repertory of Arts, vol. 12, p. 361.]

A.D. 1799, May 28.—N° 2315.

BROWNE, Henry.—" A method of making and preparing " extract of zinc." A vegetable or animal acid as common vinegar, or acid produced from vegetable or animal oil, is saturated with oxide of zinc, and the extract is thus produced. The oxide may be used in a state of ore, as calaminaris, or as blend or black jack, or flowers, or in any other state.

[Printed, 3*d*. See Repertory of Arts, vol. 16, p. 237.]

A.D. 1800, February 4.—N° 2372.

MILLER, Samuel.—" Invention of an entire new machine and " process for the more easily dividing of hard substances, &c." The agency of tida water is proposed to be applied for setting in motion mills, and lifting and grinding machinery, by a variety of apparatus, described with the aid of drawings.

[Printed, 9*d*.]

A.D. 1800, April 23.—N° 2390.

COLLINS, William.—" Sheathing for ships." Sheets of metallic alloys are used for red, yellow, and white sheathing.

8 parts of copper and 1 of zinc form red alloy, which is rolled cold. 100 parts of copper and 80 of zinc form a yellow sheathing, which is rolled at a low red heat. 16 parts tin, 16 parts zinc, and 1 part copper form a white sheathing. Other metals [or semi-metals, regulus of antimony, lead, &c. may be combined to form alloys.

[Printed, 3d. See Websters' Patent Cases, vol. 2. p. 86; cited on the trial of Muntz's Patent, see *post* No. 6325, p. 70.]

A.D. 1800, November 13.—N° 2447.

MUSHET, DAVID.—" Certain new processes and new modes of " employing processes already known, applicable to metallurgy, or " the manufacturing of metal or metals," &c. The invention relates, first, to a mode of making steel by melting malleable iron in combination with carbonaceous matters, or oxides of iron in crucibles, or suitable furnaces, which are described with drawings. The furnaces are provided with condensing apparatus, and may be used for working copper and other metals.

[Printed, 6d. See Repertory of Arts, vol. 14, p. 176; Engineers and Mechanics' Encyclopædia, vol. 1, p. 787.]

A.D. 1800, December 30.—N° 2461.

GRACE, THOMAS.—" A new method of making an acid for " corroding lead, and for other purposes, and also of a new method " of preparing and making white lead, either with or without the " said acid." Instead of using common water, " which is gene- " rally used with malt, sugar, syrup, or molasses." The water called " sour water (in which grain or other substances used in making starch have been steeped) is used for corroding lead. To this may be added the water upon which turpentine has been distilled. The water is mixed with molasses, syrup, or sugar, (1 gallon of water with half a pound of syrup). The mixture may be poured on grape skins, or raisins, or spent hops, and be left to ferment.

[Printed 3d. See Repertory of Arts, vol. 15, p. 15.]

A.D. 1802, August 31.—N° 2645.

HATELY, JOSEPH.—" Some reducing fluxes for the purifica- " tion of mineral and metallic bodies, with combustive and " phlogistive substances from their primitave ores, to purify

"metals in conjunction with or without compressed air." The ores of copper, lead, tin, zinc, or bismuth, are pulverized and mixed with the following fluxes, used alone, or combined in a powdered state, lime, gypsum, chalk, salt, sal ammoniac, alum, nitre, tartar, &c. From 2 to 4 lbs. weight of the flux may be mixed with every cwt. of ores, and melted in the ordinary pots, or suitable furnaces.

[Printed 3*d*. See Repertory of Arts, vol. 4 (*second series*) p. 250.]

A.D. 1803, February 10.—N° 2680.

CLAYFIELD, WILLIAM HENRY.—"A method of reducing and "extracting lead and other metals from a compound substance "commonly known by the name of regulus, regule," &c. The bottom of a furnace is covered with a much greater proportion of lime than is ordinarily used for lead ores. Upon the lime the regulus is disposed and is immediately fused by a strong heat. To the fused mass coal and lime in large quantities are added, a very high heat is maintained, and the metal is tapped from below.

[Printed, 3*d*. See Repertory of Arts, vol. 2 (*second series*), p. 407. Rolls Chapel Reports, 6th Report, p. 201.]

A.D. 1804, January 26.—N° 2749.

ALDERSON, GEORGE.—"New invented manufacture of metal "pipes, the same being lead lined with tin," &c. The lead pipes are cased in a mould, in which an iron mandril is inserted. When the lead is set the mandril is withdrawn, and a smaller one is re-inserted, molten tin is poured into the annular space left between the smaller mandril and the lead pipe, and forms a lining thereto. The lead pipe thus tinned is afterwards drawn to the required size. If the tin is to be on the outside it is cast first, and the lead afterwards inside it. Leaden pipes may be tinned inside by inserting a rod with the tin upon it inside the pipe, and drawing the two together.

[Printed, 3*d*. See Repertory of Arts, vol. 5 (*second series*), p. 413. Rolls Chapel Reports, 6th Report, p. 153.]

A.D. 1804, May 14.—N° 2761.

DOBBS, THOMAS.—"A new article of trade, which I deno- "minate Albion metal, and which I apply to the making of

"cisterns, linings for cisterns, covering and gutters for buildings, "boilers, vats, coffin furniture, worms for distillers," &c. The metal is formed by coating or plating lead with tin or with alloyed tin. A plate or ingot of lead or alloyed lead, and another of tin or alloyed tin, of equal or unequal thicknesses, are placed with their cleansed surfaces in close contact, and are passed together through a flatting or rolling mill, "with a hard pinch," once or oftener, so as to make the metals adhere. The rolls and metals may be heated. A plate of lead may be placed between two plates of tin, or alloys of tin, or a plate of lead coated or plated on one side may be doubled up, and rolled with the tinned surfaces outwards. A plate of lead or alloyed lead may be cast, and as soon as the metal is "set or congealed" it is coated by casting tin or alloyed tin upon and around it. The coated metal may be then rolled or pressed, or wrought in the usual way.

[Printed, 3*d*.]

A.D. 1805, April 29.—N° 2842.

SYLVESTER, CHARLES, and HOBSON, CHARLES.—"A "method of manufacturing the metal called zinc into wire and "into vessels," &c. Zinc is made malleable, and may be drawn into wire by working it at "a proper heat or by annealing it." The zinc is cast into ingots or cylinders, and where mechanically wrought or drawn or rolled, the zinc is heated to a temperature of from 210° to 300° F. which is "a proper heat."

[Printed, 3*d*. See Repertory of Arts, vol. 7 (*second series*), p. 404; Engineers' and Mechanics' Encyclopædia, vol. 2, p. 926.]

A.D. 1806, April 1.—N° 2926.

MILLER, SAMUEL.—"Various improvements in the working "coal, tin, lead, and other mines," &c. A piercer or pointed bar or drill attached to a chain is worked up and down by a steam engine, and used for boring shafts. Pumping apparatus is also described with the aid of drawings; these show an arrangement of chains and buckets for drawing up coals, water, and other materials.

[Printed, 6*d*.]

A.D. 1807, January 15.—N° 3001.

WYATT, Walter Henry.—"A new discovery of the means of "facilitating the chemical action between copper and several "saline substances, so as to produce important improvements in "the art of separating gold and silver from copper plaited or "united with either of those metals, and in the manufacturing of "sulphate of copper, and in the making of many kinds of colours "for painting."—(*A communication.*) The specification, which is long and diffuse, first describes how muriatic acid in a diluted form will act upon and dissolve copper without using it in a concentrated or hot state. Modes of making green colours by combining copper and arsenic are described. Copper is also separated from gold or silver, with which it may be combined, by dissolving the copper with muriatic acid, and treating the residuum in the usual way to separate gold and silver.

[Printed, 6d. See Rolls Chapel Reports, 7th Report, p. 104.]

A.D. 1807, January 29.—N° 3004.

SOUTHCOMBE, Benjamin.—"A new method of working of "flexible or malleable metallic plates into convex and concave "forms or hollow shapes." "Gold, silver, or copper may be "worked by raising hammers on stakes, but iron or tinned iron "tinned plates" are "refractory metals," and cannot be so worked; and a machine called "a stretcher," which is described with the aid of drawings, is used for giving the refractory metals the required hollow forms. Two rollers are used, one is fixed and the other moveable, and so adjusted that the pressure on the rollers may be increased or diminished as required, by moving a "pen-"dulous handle," which acts on the axis of the moveable roller.

[Printed 6*d*. See Rolls Chapel Reports, 7th Report, p. 196.]

A.D. 1808, January 23.—N° 3099.

NOBLE, Edward Moore.—"New method of making carbonate "of lead commonly called white lead." Lead is separated into small pieces, and placed in a partially closed vessel, and is partly covered with "acetous acid or vinegar or acetite of lead." Carbonic acid gas and oxygen gas or atmospheric air, or all three

mixed, are introduced into the vessel. The surface of the lead is thus acted upon, and carbonate of lead is formed, and may be removed as it is formed.

[Printed, 3*d*. See Repertory of Arts, vol. 13 (*second series*), p. 244; Rolls Chapel Reports, 7th Report, p. 201.]

A.D. 1808, January, 26.—N° 3101.

PRESTON, Thomas.—"A new method of setting boilers for "steam engines, pans for melting lead, tin, pewter, and other "metals of easy fusion, and a new mode of discharging the pans "for melting lead, tin, pewter," &c. The specification and drawings describe modes of fixing boilers and vessels or pans for melting metals. The vessel is fixed upon as many small bearings as may be sufficient to support it properly, the fire is allowed to rise freely in a casing on every side around the vessel; the smoke is carried off through an aperture, regulated by a damper to a chimney."

[Printed 6*d*. See Rolls Chapel Report, 7th Report, p. 106.]

A.D. 1809, July 26.—N° 3249.

HEAPS, Richard.—"An improved method of forming pipes "and sundry other articles in lead, pewter, or tin, or metals of "that nature." Moulds of brass, iron, or other suitable materials are employed. The moulds have apertures in their sides or bottoms, which are closed with a wedge valve, or by other suitable means. The moulds are filled by immersing them in the molten metal, and are filled from below, or at the side, so as to be free from the scoria formed on the surface of the metal, or the moulds may be filled at the top by immersing them until the molten fluid metal runs over the top; or side channels of communication may be employed for the same object.

[Printed, 3*d*. See Rolls Chapel Reports, 7th Report, p. 204.]

A.D. 1810, February 1.—N° 3296.

COCK, David.—"Vessels of a new construction, for melting "metals and heating fluids."

[No specification enrolled.]

A.D. 1810, September 26.—N° 3381.

NORRIS, Thomas.—" A new mode of sheathing or covering the " bottoms of ships or vessels with certain matters or materials, so " as to be a substitute for copper." The alloy proposed to be used consists of lead 100 lbs., tin 12 lbs., regulus of antimony 3 lbs., arsenic 3 lbs.; or lead 100 lbs., and tin 20 lbs.; or lead 100 lbs., regulus of antimony 3 lbs., arsenic 3 lbs. The metals are fused in a crucible, and cast into ingots or sheets, and rolled; heat may be applied during the rolling process.

[Printed, 3d. See Rolls Chapel Reports, 8th Report, p. 86.]

A.D. 1811, June 27.—N° 3460.

COOK, Benjamin, and ATTWOOD, Thomas.—" Combining " and connecting together different kinds of metals, and of com- " bining and connecting metals and wood together, in such way as " to make the combination thereof, whether the same be of metals " or of metals and wood, have one appearance or representation " only." Tubes are made from rolled sheet iron or steel, by cutting the sheets into strips of suitable breadth, sharpening one end of each strip, and forcing it through the hole of a draw plate, such as is used for drawing wire. The strip is forced through the said holes or through grooves in rolls " until the two sides meet." The two sides are then either soldered or not, as may be convenient. The tubes so formed are placed in tubes or casings of brass, copper, or other more valuable metals or alloys, and are again forced through holes in plates, or through grooved rollers, until the outer and inner tubes are closely united. The outer and inner tubes may be formed simultaneously by placing the two strips of metal together; the outer one being of brass or valuable metal or alloy, has its sides turned over the inner strip, the ends of both are sharpened, and they are together forced through holes in a draw plate, or grooves in rolls, and so " form a tube with a small open- " ing along one side thereof." The tubes may be made round, oval, square, or of other forms, by using suitably shaped holes in the plate, or grooves in the rollers. By similar means a strip of metal may be pressed firmly on or round a rod or tube of wood or other substance.

[Printed, 3d. See Rolls Chapel Reports, 8th Report, p. 87.]

A. D. 1811, September 9.—N° 3486.

STRACHAN, William.—" A new method of preparing the ore " of cobalt," &c. The ore is first cleansed, then pounded in a vessel with a pestle, or crushed by rolling apparatus. It is then sifted through a fine sieve and separated from earthy particles.

[Printed, 5d. See Repertory of Arts, vol. 20 (*second series*), p. 328.]

A. D. 1812, October, 31.—N° 3612.

SHEFFIELD, William Evetts.—" An improved apparatus " and furnaces for separating metallic and other substances from " their ores," &c. The apparatus is described in the specification with the aid of drawings, as consisting of two parts, an "air con- " ductor," and a pot for separating zinc from its ore.

The air conductor is a pipe which is introduced into a reverberatory or other furnace, for the purpose of injecting currents of air, gas, or other elastic fluid into the furnace, in " direct contact " with" the ores and burning materials.

The pot is provided with a perforated tube passing up the centre thereof, for the purpose of conveying away the sublimed zinc. A closed furnace is described for separating metallic zinc from its ore. It has suitable communications for conveying the fumes to the condensing chamber, and is constructed with shelves or compartments fixed or moveable, so that the ores which are " in a " state of powder, or which require to be pulverized, may be " acted upon with a large surface exposed to the heat."

[Printed, 9d. See Engineers and Mechanics' Encyclopædia, vol. 1, p. 576; Rolls Chapel Reports, 8th Report, p. 94.]

A.D. 1812, December 19.—N° 3630.

LEWIS, John.—" Improvements in the art of smelting copper " ore."

[No specification enrolled.]

A. D. 1813, March 15.—N° 3667.

EDWARDS, Richard; and WILLIAMS, William.—" A " certain process for extracting arsenic from any of the ores or " other substances in which it is contained," &c. The sooty deposits contained in the flues and chimneys of furnaces used for

calcining or roasting copper, tin, or other ores, are often found to contain much arsenic. These deposits, or ores containing arsenic, are roasted and heated in a furnace, constructed as described in the specification and drawings. The furnace is connected with a condensing house, and suitable apparatus is used "at a degree of "heat sufficient to evaporate the sulphur, but not to sublime "the arsenic." The arsenic is "reduced to a solid state by sub-"limation in close vessels."

[Printed, 9*d*. See Rolls Chapel Reports, 8th Report, p. 94.]

A. D. 1813, July 23,—N° 3723.

LEWIS, John.—An improvement in the art of smelting copper "ore." The "ore and metal furnaces" are built between two calciners, which are elevated above the furnaces. The calcined ores and metal are conveyed in a red hot state through iron pipes directly from the calciners to the furnace. Also, "the run of the metal "from the furnace to the metal pits" is lengthened.

The calciners and furnace are described with the drawings.

[Printed, 8*d*. See Repertory of Arts, vol. 25 (*second series*), p. 321. Rolls Chàpel Reports, 8th Report, p. 100.]

A.D. 1813, October 15.—N° 3740.

OSBORN, Henry.—"Making tools for tapering cylinders of "different descriptions made of iron, steel, metal, or mixture of "metals, and also for tapering bars of iron, steel, metal, or mix-"ture of metals." The specification and drawings describe rollers formed by fixing collars of iron or other metal upon spindles made of cast or wrought iron. The collars on the upper and lower spindles correspond in pairs, and are made with grooves of a taper shape, so as to roll bars or tubes of a taper shape externally.

[Printed, 4½*d*. See Repertory of Arts, vol. 25 (*second series*), p. 11; Rolls Chapel Reports, 8th Report, p. 98.]

A.D. 1814, September 23.—N° 3843.

SHEFFIELD, William Evetts.—"Improvements in the "working or manufacturing copper and its compounds, and "other metallic substances, or any or either of the same." Copper and its compounds are subjected to a process of cementa-

tion in a closed furnace or vessel, together with charcoal of wood or fossil coal or animal substances. The copper may be granulated or otherwise subdivided. The copper so treated is suitable for being made into brass. A degree of heat greater than that used for annealed copper is employed, and it may be carried to the point of fusion. The copper or its compounds will be found to be well cemented when its surfaces become striated or dotted like "the skin of the tip of one's finger."

Plates of metal are cut by means of cutting and rounding cylinders into rounded strips suitable for being made and drawn into wire.

[Printed, 5*d*. See Repertory of Arts, vol. 29 (*second series*), p. 148; Rolls Chapel Reports, 8th Report, p. 104.]

A.D. 1815, March 29.—N° 3901.

SMITH, Richard.—"Improvements in smelting iron stone or "iron ore, lead ore, copper ore, and other minerals or metallic "substances, also of refining crude iron, lead, copper, gold, silver, "tin, and all other mettals or metallic bodies, and of making "and manufacturing iron."

[No specification enrolled.]

A.D. 1815, June 8.—N° 3923.

POSTEL, John.—"A method of extracting gold and silver from "the cinders of gold refiners and other substances by means of "certain curious machinery." The machinery consists of a number of vats or vessels with cast-iron bottoms in which the cinders and other substances are placed after being pulverized in suitable mortars. The vats are ranged round a centre vertical shaft, which by suitable gearing and apparatus is made to set in motion revolving rakes; these stir up the cinders or other substances in the vats, and mix them with quicksilver and other amalgamating materials. The mixture is washed and then operated upon in retorts in the usual way.

[Printed, 6*d*.]

A.D. 1815, July 12.—N° 3938.

BEVAN, William, the younger, and BEVAN, Martin.—"Improvements in the construction of furnaces and their con-

" tingent apparatus for the purpose of smelting of copper and " other ores and the making of copper and other metals." The specification and drawings describe compound furnaces, in which one fireplace is made to heat a melting furnace, and by means of suitable flues and "regulators" the waste heat is conducted to a calcining furnace. One chimney may be employed for several furnaces. One furnace may be made to heat several calcining furnaces.

[Printed, 7*d*. See Rolls Chapel Reports, 8th Report, p. 107.]

A.D. 1816, February 20.—N° 3983.

LARUE, HENRY DE.—" An improved cylindrical gold and silver " sweep and washing machine." The specification and drawings describe a cylindrical amalgamating mill with flutings of cast-iron formed in its interior. Pulverizing machines on the pestle and mortar principle, and self-acting apparatus of ordinary construction, as used for operating on crushed ores, are also described.

[Printed, 1*s*. See Rolls Chapel Reports, 8th Report, p. 111.]

A.D. 1816, August 3.—N° 4050.

POOLE, JOHN.—" Brass and copper plating, or plating iron or " steel with brass or copper, both plain and ornamental, and " working the same into plates, bars, or other articles." The iron or steel is well cleansed and dipped in a strong solution of sal ammoniac, when it is to be covered with a plate or coating of brass or copper, the brass or copper is dipped in a mixture of borax and just sufficient water to render it fluid. The two metals are then placed in close contact and packed in "a pan or pott " with sand or cement," and exposed to great heat until the brass or copper is fluxed or melted upon the iron or steel. The plated metal may then be rolled, beaten, or stamped into the required shapes. Or the iron or steel may be rubbed or bathed with the solution of sal ammoniac, and be then heated and rubbed or bathed with prepared borax, and then dipped in a pot of melted brass or copper, and a slight covering thereof will be attached to the iron in such parts and patterns as may be required. Parts of the brass or copper may then be cut or filed away, so as to show the steel in ornamental designs.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 120.]

A.D. 1816, August 3.—N° 4053.

DAYMAN, John.—"A method of covering or coating iron, " steel, or other metals or mixtures of metals." The iron, steel, or other metallic articles are inclosed in a kind of mould which is made of or covered with suitable substances, to which the coating metal, as lead or tin, will not adhere; as much space is left in the mould around the article to be coated as is intended to be occupied by the coating metal. The mould is then dipped into a bath of the molten coating metal, which enters through suitable openings in the mould and adheres to the article to be coated.

[Printed, 6*d*. See Repertory of Arts, vol. 31 (*second series*), p. 263; Rolls Chapel Reports, 8th Report, p. 116.]

A.D. 1816, September 30.—N° 4064.

CLAYTON, Robert.—"A new method of preparing, making, " and finishing metal and composition blocks, plates, rollers, " types, and dies," &c. Designs or patterns are formed on the surfaces of plates of zinc or zinc alloyed with lead and tin by causing metallic salts, as acetate of lead, sp. gr. 1,020 (which is preferred), to act upon and eat away the surface of the zinc in the parts not defended by varnish. When a pattern has been formed in relief on the plate or roller, it may be impressed in or upon a suitable wood surface, and a cast taken from the impressed design by pouring in a suitable alloy. Equal weights of bismuth, tin, and lead, or 4 parts tin, 4 lead, 3 bismuth, and 1 antimony, form a good alloy.

[Printed, 4*d*.]

A.D. 1816, November 21.—N° 4085.

HALL, Walter.—"A method or methods of making soft lead " out of hard lead or slag lead." The calcination of hard or slag lead in the process of marking red lead is arrested at a comparatively early stage in the process, when a certain portion has been calcined, and the rest of the lead when withdrawn is found to be soft lead. In a charge of about 20 cwt. of hard or slag lead, 3½ to 5 cwt. may be calcined, and the remainder be withdrawn as soft lead.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 117.]

A.D. 1817, May 6.—N° 4115.

COLLINS, William.—" An improvement or improvements in " the composition and preparation of a metal for the manufacture " thereof into sheets or plates, and the application, when so pre- " pared and manufactured, to the preservation of ships by sheath- " ing or covering their bottoms therewith," &c. Alloys or mixed metals of the nature and qualities of bronze are used for sheathing ships, 80 parts of copper and 20 parts of tin from a suitable alloy. The alloy should be cast in the form of ingots, and rolled at a low red heat. Improvements in chain pumps are also described.

[Printed, 3*d*. See Repertory of Arts, vol. 32 (*second series*), p. 67; Rolls Chapel Reports, 8th Report, p. 119.]

A.D. 1817, June 10.—N° 4134.

PARNALL, John.—" Invention and improvement of tinning " or covering with tin sheets or plates of copper, brass, or zink." The copper, brass, or zinc plates are bent to allow of their standing on their edges; they are placed in a vessel containing spirits of salts or marine acid and water, in proportions of about two pints of the former to three gallons of water. The plates or sheets are then taken out and heated in a furnace to raise a scale; this is all removed by beating the plates, which are then rolled through case-hardened iron rolls. The plates or sheets are then placed for 24 hours in troughs of lees of fermented bran, produced by steeping bran in water, heating it, and letting it ferment for about four days. The sheets are then steeped in a bath of " two pints of " vitriolic acid to two gallons of water for four hours, then washed " and cleansed with water and sand. They are then dipped in " melted tin, having grease or other suitable material on the top " of it," once or oftener, and afterwards in melted grease to remove the superfluous tin. The plates are then cleaned with bran and rolled.

[Printed, 3*d*. See Repertory of Arts, vol. 32, p. 140.]

A.D. 1817, August 5.—N° 4146.

VALLET, Louis Felix.—" The manufacture of a new orna- " mental surface to metal or metallic composition." The surfaces

of tin or of metals that are coated with tin are ornamented by applying to them, in patterns, acids or acid mixtures, which give to them a crystalline surface. The composition may be laid on with a brush or sponge; it may be made by mixing together ten parts of sulphuric acid, diluted with five times its bulk of water, and one part of nitric acid, diluted with its bulk of water.

[Printed, *3d.* See Repertory of Arts, vol. 33 (*second series*), p. 74; Rolls Chapel Reports, 8th Report, p. 121.]

A.D. 1817, October 3.—N° 4168.

HARRY, William.—" An improvement or improvements in the " building and erecting roofs or upper parts of furnaces used for " the smelting of copper and other ores, or any of their metals, or " for any other purpose requiring strong fires." A smelting furnace is described with drawings; its roof is formed of brick or metal in the form of an arch in the usual way, and is covered, to the thickness of about eight inches, with a fire-resisting cement or composition. The composition is made by mixing together fire clay, sand, and pulverized fire bricks. A certain clay called "Dinas' " fire clay, found at Neath, in Glamorganshire," is preferred.

[Printed, *5d.* See Rolls Chapel Reports, 8th Report, p. 119.]

A.D. 1817, December 5.—N° 4182.

TURNER, John.—"Certain improvements in the plating of " copper or brass, or a mixture of copper and brass, with pure or " standard gold, or gold mixed with a greater portion of alloy, " and in the preparation of the same for rolling into sheets." Plates of gold, or gold and its alloys, are united to copper ingots by making the surfaces of the two metals clean and even, and bringing them into close contact, and binding them with wire, and soldering them together. Silver filings, or strips of silver, or alloys of silver, mixed with borax or other suitable flux, are placed on the edges of the gold and copper, and fused in a suitable furnace. The gold is thereby united to the copper, and may be rolled out into sheets.

[Printed, *3d.* See Repertory of Arts, vol. 34 (*second series*), p. 10; Rolls Chapel Reports, 8th Report, p. 127.]

A.D. 1817, December 19.—N° 4191.

CHABANNES, Jean Frederick Marquis de.—"New " method of constructing pipes or tubes of copper, sheet lead,

" sheet iron, tin, or other metals or mixture of metals capable of " being reduced into sheets." The specification and drawings describe an apparatus, consisting of a cylinder and a lever press and wedge, for turning and closing the seams of pipes or tubes, made by bending sheet metals.

[Printed, 5*d*. See Rolls Chapel Reports, 7th Report, p. 118.]

A.D. 1818, April 18.—N° 4248.

CRAWSHAY, William, the younger, and MUSHET, David. —" Invention or improvements for the making or manufacturing " bar or other iron from certain refuse slags or cinders produced " in the smelting of copper ores and in the manufacturing of " copper." Copper slags are sorted, and those which contain the greatest proportion of iron are broken small, and smelted with $\frac{3}{8}$ to $\frac{5}{8}$ their weight of limestone. If the ores contain much copper, pure iron ores in a proportional quantity are mixed therewith; the iron thus obtained is wrought up in the usual way.

[Printed, 3*d*. See Repertory of Arts, vol. 38 (*second series*), p. 13.]

A.D. 1818, April 23.—N° 4249.

APPLEGATH, Augustus.—" Certain improvements in the art " of casting stereotype or other plates," &c. Modes of forming a metallic mould or matrix are described.

An alloy, composed of 20 parts lead, two parts regulus of antimony, and one or two parts bismuth, is used by preference in casting the stereotype plates.

[Printed, 7*d*. See Repertory of Arts, vol. 36 (*second series*), p. 69; Rolls Chapel Reports, 8th Report, p. 123.]

A.D. 1818, July 22.—N° 4280.

ORMROD, Richard.—" An improvement in the manufacturing " of copper or other metal cylinders or rollers for calico printing." Cylinders are formed of copper or brass, and cleansed by the use of acids and by scouring them. They are then drawn with a mandril inside through steel collars to the required size, and finished by being polished on a mandril in the usual way.

[Printed, 3*d*. See Repertory of Arts, vol. 34 (*second series*), p. 266; Rolls Chapel Reports, 8th Report, p. 127.]

A.D. 1818, July 24.—N° 4284.

BLAKEMORE, Richard and James John.—" A new kind of " plate which we denominate amorphous metal plates, and likewise " a certain improved and more perfect method or methods of " chrystalizing or rendering chrystalizable the surface of tin " plates, or iron or copper plates tinn'd," &c. Instead of using tin alone in tinning or coating plates, an alloy or mixture of tin and some metal or semi-metal or alloy which sets or cools at a different degree of temperature to tin is used. The quantity of such alloy or metal so added to the tin must be sufficient to produce, or leave on the surface of the coated plate marks of crystallisation which serve for ornamental purpose; the metals or alloys that may be mixed with the tin are zinc, bismuth, copper, lead and brass.

[Printed, 3*d*. See Repertory of Arts, vol. 34 (*second series*), p. 198; Rolls Chapel Reports, 7th Report, p. 120.]

A.D. 1818, August 7.—N° 4287.

HOLLINGRAKE, James.—" An improved method of making " or manufacturing copper or other metal rollers for calico " printing." Copper or other metallic rollers are made by casting them in the moulds in the usual way, and then applying the necessary pressure to the molten metal so as to compress it, and make it close and sound. No apparatus is described, as any that may be suitable may be employed.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 132.]

A.D. 1818, December 5.—N° 4301.

BRUNEL, Marc Isambard.—" A new species of tin foil capable " of being crystallized in large, varied, and beautiful crystalliza- " tion." A sheet of tin or tin foil is laid evenly and closely upon a flat plate of metallic or vitreous substance, which may be heated from below by a bath of melted alloy as of $\frac{3}{4}$ tin and $\frac{1}{4}$ lead; heat is then applied, by means of common gas jets and flexible tubes, to those parts to which it is desired to give an ornamental crystalline conformation. Sulphuric acid diluted with 5 parts of water, and nitrous acid diluted with 1 part of water, are mixed in proportions of 10 of the former to 1 of the latter, and applied by a brush to the

surface of the tin; it is then washed, and may be varnished or japanned in the usual way.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 130.]

A.D. 1819, March 4.—N° 4347.

HAYCRAFT, SAMUEL.—"Certain improvements in the manu-"facturing of spoons, forks, and other articles of iron, silver, or "other suitable metal," &c. Articles made of iron, silver, or other metals or alloys are first stamped into suitable blank forms. They are then coated with silver or other metallic coating, and finished by stamping or pressing them between two finely polished surfaces or dies, which give smoothness and brightness to the surfaces at one operation.

[Printed, 3*d*. See Rolls Chapel Reports, 8th Report, p. 133.]

A.D. 1819, May 15.—N° 4371.

HOLLIGRAKE, JAMES.—"Making and working a manufacture "for applying a method of casting and forming metallic sub-"stances into various forms and shapes, with improved closeness "and soundness in texture." Pneumatic and hydro-mechanical apparatus consisting of pistons and cylinders, connected with suitable pipes and valves, &c., are described, for exciting a pressure upon the surface of metals when cast in various forms in moulds. The object is to produce closeness and soundness in the metal by compressing it while it is becoming cool.

[Printed, 3*d*. See Repertory of Arts, vol. 41 (*second series*), p. 162; Rolls Chapel Reports, 8th Report, p. 134.]

A.D. 1819, June 22.—N° 4382.

BEDFORD, STEPHEN.—"Improvement in the preparation of iron "and other metals for various purposes, and also an improvement in the converting British iron and steel." Vitrified iron slag, scoria, and cinders are fused with wrought iron to produce steel or impart improved qualities to the iron.

Slags, vitrified refuse, and cinders are also fused with other metals or ores, to improve their quality. The alternate layers of the vitrified substances, and the metals, are placed in an air furnace, and fused.

[Printed, 3*d*. See Repertory of Arts, vol. 38 (*second series*), p. 138; Rolls Chapel Reports, 8th Report, p. 134.]

A.D. 1819, November 1.—N° 4404.

CONGREVE, Sir WILLIAM.—"An improved mode of inlaying "or combining different metals," &c. Metals or alloys that melt at different temperatures are combined in various shapes or patterns.

A metallic plate or surface is first formed of suitable metal, having intervals or interstices formed in it in pattern; into these a second metal or alloy is run in a molten state, and an inlaid surface is thus produced.

[Printed, 3d. See Repertory of Arts, vol. 42 (*second series*), p. 272; London Journal (*Newton's*), vol. 1, p. 241.]

A.D. 1820, April 11.—N° 4445.

BURR, THOMAS.—"Machinery for manufacturing lead into pipes "and sheets." Molten lead is poured into a cylinder; "after it "has stood until the lead is set it is forced by means of a piston "through a suitable aperture in connection with a core or rod so "as to form a pipe or tube. Sheets are made in a similar way "by the pressure of a piston in a cylinder."

[Printed, 3d. See Repertory of Arts, vol. 41 (*second series*), p. 267; London Journal (*Newton's*), vol. 1, p. 411.]

A.D. 1820, May. 13—N° 4459.

KENRICK, SAMUEL.—"An improved method of tinning cast-"iron vessels of capacity." The vessel is tinned in the usual way, and when an even coating is spread upon its surface the molten tin, before it has "time to run," is exposed to the action of currents of cold air directed upon it from suitable pipes. The tin is thus cooled, and caused to set evenly.

[Printed, 7d. See Repertory of Arts, vol. 40 (*second series*), p. 335; London Journal (*Newton's*), vol. 2, p. 427;

A.D. 1820, October 23.—N° 4504.

TAYLOR, WILLIAM.—"An improved furnace for the smelting of iron and other ores." The furnace is provided with a hearth so constructed that the blast may be introduced through two or more tuyeres. The tuyeres may be placed round the hearth, and at different elevations.

[Printed, 5d. See London Journal (*Newton's*), vol. 2, page 137.]

A.D. 1820, December 9.—N° 4515.

DOBBS, THOMAS.—" A new mode of uniting together or plating tin upon lead." The surface of the article of lead to be tinned when heated, or just cast is rubbed with hurds, rags, or tow, impregnated with turpentine or resinous substances, and a small quantity of tin. The article, such as a pipe or plate of lead, is then so placed in a mould that a space is left between the surface of the mould and that of the leaden article; tin is run into this space, and is united closely with the lead. The leaden article, if a pipe or plate, may be drawn, or rolled, or stamped. " The plating may be " effected when the lead is cold, and without previous tinning."

Surfaces of lead may be tinned by placing a small quantity of tin thereon, when heated or cold, with resinous substances, and applying heat to melt the tin used and make it run.

[Printed, 3*d*. See Repertory of Arts, vol. 38 (*second series*), p. 207; London Journal (*Newton's*), vol. 2, page 89; Engineers and Mechanics' Encyclopædia, vol. 2, page 57; Rolls Chapel Reports, 7th Report, p. 122.]

A.D. 1821, August 3.—N° 4598.

POOLE, JOHN.—" Improvements in plating iron or steel with " brass or copper, or copper alloyed with other metal or metals," &c. The iron or steel preferred is that made from Cumberland ore, " sheared, and afterwards annealed," and well cleaned. The molten brass is contained in a vessel provided with a suitable ledge, so that the part of the iron required to be coated may be immersed in and pressed down upon the molten brass. The vessel has feet, so that a fire may be applied underneath it. The iron, or the parts of its surface required to be coated, is bathed or rubbed with a strong solution of sal-ammoniac or borax. It is then placed on the ledge of the vessel, and pressed down upon the surface of the molten brass, and heated in a furnace.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 3, p. 237.]

A.D. 1822, April 16.—N° 4667.

DANIELL, WILLIAM.—" The rolling of iron into bars used for " making or manufacturing tin plates." The iron is rolled " per- " pendicularly between a pair of rolls with grooves of different " gradations." The iron is cut by shears into pieces " of four

" inches and half an inch square." The first groove is of such a size as to admit each piece "to pass through perpendicularly." By thus rolling the iron "the inside of the piece of iron is brought " to the surface, and the imperfection it contains, instead of being " dispersed and intermixed throughout, is forced to the edge and " ends."

[Printed, 3*d*. See Repertory of Arts, vol. 43 (*second series*), p. 73; London Journal (*Newton's*), vol. 6, p. 75.]

A. D. 1822, August 24.—N° 4698.

MITCHELL, WILLIAM.—" A process whereby gold and silver " plate, and other plate formed of ductile metals, might be manu- " factured," &c. The process consists merely in the application " of a water press, such as is known by the name of Brahmah's " press," for stamping or pressing articles made of gold and silver or other metals or alloys, instead of using the screw press.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 6, p. 74.]

A. D. 1822, September, 3.—N° 4700.

VAZIE, ROBERT.—" An improvement in the compounding of " different species of metals." Brass and cast iron are alloyed together by first melting the iron and adding the brass, which may be also previously melted, or the molten metals may be run into a common receptacle. One part of brass with 100 parts of iron may be used for bearings, or steam cylinders and other purposes.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 5, p. 175.]

A. D. 1822, December 20.—N° 4743.

PASS, WILLIAM.—" An improvement in calcining and smelting " of various description of ores." A furnace is described which is connected with a feeding hopper for supplying fuel in a heated or partly ignited state to the fire place. At the back of the furnace is placed another fireplace, over and through which the heated fumes and gases from the furnace are driven. Underneath this second fireplace is a receiver which catches the metallized particles that may fall. A machine called the "centrifugal bel- " lows," is applied "at the farther end of the furnace," to create a blast on the exhaust principle.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 6, p. 74.]

A.D. 1823, January 8.—N° 4746.

NEVILLE, James.—"An improved method of producing and "applying heat to and constructing and erecting furnaces and other "reservoirs, severally used for the various purposes of roasting "or smelting metallic ores or other substances, melting metals "or any other matter, &c." The specification and drawings describe apparatus for applying the fan blast to furnaces used for melting or working metals. "Though the operation of a fan or "set of revolving flies is familiar and well known for cleansing "corn," &c., the patentee claimed "its application for drawing or "forcing atmospheric air through fuel."

[Printed, 10*d*. See London Journal (*Newton's*), vol. 8, p. 236.]

A.D. 1823, April 8.—N° 4773.

POPE, Christoher.—"A composition of certain metals to be "used for the purpose of sheathing the bottoms of ships and "vessels, and of roofing the tops of houses," &c. Sheets for sheathing ships and roofing buildings are made of tin and zinc, or tin, zinc, and lead united.

"A quantity of zinc is first melted," then an equal quantity of tin. The alloy is cast in the form of plates and rolled, or a quantity of lead is first melted, and then twice that quantity of tin. These are mixed and "cast in lumps." Three times the quantity of zinc is next melted, and the lead and tin lumps are thrown into and melted with the zinc. The alloy is cast in the form of plates and rolled.

[Printed, 3*d*. See Repertory of Arts, vol. 46 (*second series*), p. 202; London Journal (*Newton's*), vol. 5, p. 289; Register of Arts and Sciences, vol. 2, p. 213. Engineers and Mechanics' Encyclopædia, vol. 2, p. 647.]

A.D. 1823, June 14.—N° 4802.

MUSHET, Robert.—"A mean or means, process or processes, "for improving the quality of copper, and of alloyed copper, "applicable to the sheathing of ships and other purposes." Copper is alloyed with zinc, tin, or alloys, to impart to it tenacity and fibrous texture, and make it suitable for sheathing ships. The following proportions are recommended:—

100 lbs. copper, 2 oz. "zinc regulus or speltre."

100 lbs. copper, 2 oz. grain or block tin, 4 oz. regulus of antimony, 8 oz. regulus of arsenic.

100 lbs. copper, ¼ oz. regulus of zinc, ½ oz. grain or block tin, 1 oz. of regulus of antimony, and 2 oz. of regulus of arsenic.

100 lbs. copper, 1 oz. zinc, 1 oz. tin.

100 lbs. copper, 1 oz. zinc or tin, 2 oz. antimony

100 lbs. copper, 1 oz. zinc or tin, 4 oz. arsenic.

The alloying metals are added to the copper before, or by preference after the copper is melted, its surface being protected by the usual coating of charcoal or other substances.

If on assaying the metal an excess of alloy is found (by its exhibiting "a toothy fracture") the metal will not have acquired the fibrous texture, and the charcoal is withdrawn from the surface to allow the oxygen of the air to act upon the metal, which is agitated by "flapping it with an iron rabble."

The alloyed copper is stated to possess four times the strength of ordinary copper.

If the copper is found to be alloyed in excess, ordinary toughened or refined copper may be added thereto, to reduce it to the property consistency.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 8, p. 245; Register of Arts and Sciences, vol. 2, p. 99; Engineers and Mechanics' Encyclopædia, vol. 2, p. 647.]

A.D. 1823, December 9.—N° 4878.

HORNE, THOMAS, the younger.—"Improvements in the manu-"facture of rack pullies in brass or other metals." Plates of brass or other metal of the suitable size and shape are indented, so as to give them the proper toothed shape, by passing them between rollers; one of the rollers has raised teeth upon its surface corresponding to the indentations required.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 8, p. 70.)

A.D. 1824, May 15.—N° 4953.

CHURCH, WILLIAM.—"Certain improvements in the apparatus "used in casting iron and other metals."

[No Specification enrolled.]

A.D. 1824, October 7.—N° 5005

BENECKE, FREDERICK, SHEARS, DANIEL TOWERS, and SHEARS, JAMES HENRY.—"Improvements in the making,

" preparing, or producing of spelter or zinc." The specification and drawings describe apparatus for obtaining and preparing zinc by " distillation per latus," instead " distillation per descen- " sum," as in the ordinary way. The zinc, instead of carrying down other metals as lead, is volatilised, and leaves those metals behind it. The furnaces are so constructed that they may be readily charged, and their heat be observed and regulated. The fuel is supplied in small quantities at intervals. A large deep culvert is used for an ash and air pit.

[Printed, 7*d*. See Repertory of Arts, vol. 1 (*third series*), p. 446; Register of Arts and Sciences, vol. 4, p. 74; Engineers and Mechanics' Encyclopædia, vol. 2, p. 926.]

A.D. 1824, November 6.—N° 5031.

WHITE, JOHN, the younger, and SOWERBY, THOMAS.—" An " improved air furnace for the purpose of melting or fusing " metallick substances." The furnace may be made of any required shape, and is to be provided with flues or openings made in its sides, and so arranged that currents of air may be driven in different directions to the parts where the heat is required to be applied. A great economy is said to be effected in the fuel required by thus arranging the flues. A suitable shape of furnace is described with drawings.

[Printed, 6*d*. See Repertory of Arts, vol. 2 (*third series*), p. 288; London Journal (*Newton's*), vol. 10, p. 69; Register of Arts and Sciences, vol. 3, p. 70; Engineers and Mechanics' Encyclopædia, vol. 1, p. 559; Rolls Chapel Reports, 7th Report, p. 125.]

A.D. 1824, November 11.—N° 5037.

BRUNET, PIERRE.—" A furnace made upon a new construc- " tion."

[No Specification enrolled.]

A.D. 1824, December 18.—N° 5057.

ROBERTS, SAMUEL.—" An improvement in the manufacture of " plated goods of various descriptions." Silver edgings are fixed on metallic articles coated with silver by filing the edge to nearly the required shape, a silver thread of the requisite thickness is hard soldered on the edge, and " flatted with a hammer upon a metal " stake to the breadth and strength required. The outer edge of

" the thread thus projects a little way, and is soft soldered, and " the edges are filed down and burnished" "till the joining " disappear."

[Printed, 3*d*. See Repertory of Arts, vol. 4 (*third series*), p. 197; London Journal (*Newton's*), vol. 11, p. 26.]

A.D. 1825, January 18.—N° 5084.

CHURCH, WILLIAM.—" Improvements in casting cylinders, " tubes, and other articles of iron, copper, and other metals." Moulds and apparatus for casting metals are described with drawings. The mould is air-tight, and is connected with pneumatic apparatus, so as to exhaust the mould of air, and keep it in an exhausted state. The metal may be introduced into the mould from below, and any desired pressure may be given to the molten metal while it is being cooled, which is done by means of a jacket containing water, which is placed round the mould.

[Printed, 5*d*. See Repertory of Arts, vol. 6 (*third series*), p. 269; also vol. 1 (*third series*), p. 271; London Journal (*Newton's*), vol. 11, p. 230; Mechanics' Magazine, vol. 6, p. 209; Register of Arts and Sciences, vol. 4, p. 117; Engineers and Mechanics' Encyclopœdia, vol. 1, p. 558.]

A.D. 1825, February 26.—N° 5111.

GORDON, DAVID, and BOWSER, WILLIAM.—" Improvements " in uniting and plating or coating iron with copper, or with any " other composition, whereof copper is the principal ingredient." Iron is coated with copper by heating its cleansed surface to a white or welding heat, and dipping it into molten copper, or pouring molten copper upon it, the "unburnt or oxigenous air of " the atmosphere is, to a certain extent, excluded (the more per- " fectly the better) during the process of heating, and exposing " the heated metals to act on each other."

The iron so coppered, if malleable, may be rolled into thin sheets, and manufactured either in a cold or heated state.

Suitable furnaces and apparatus are described for carrying into effect the process.

[Printed, 5*d*. See Repertory of Arts, vol. 3 (*third series*), p. 193; London Journal (*Newton's*), vol. 12, p. 89.)

A.D. 1825, March 15.—N° 5121.

HANCOCK, THOMAS.—" Improvement or improvements in the " making or rendering ships' bottoms, vessels, and utensils of

" different descriptions, and various manufactures and porous or " fibrous substances, impervious to air and water, and for coating " and protecting the surfaces of different metallic and other " bodies."

[No Specification enrolled.]

A.D. 1825, August 8.—N° 5231.

HAYTON, Richard.—" Improved method of precipitating of " copper from cupreous waters flowing from mines, or from " artificial waters, and of reducing some ores to their metallic " state."

[No Specification enrolled.]

A.D. 1825, August 15.—N° 5241.

LARIVIERE, Marc.—" Perfected machine for perforating metal, " plates of gold, silver, tin platina, brass, or copper, being appli-" cable to all the purposes of sieves hitherto employing either " canvas, linen, or wire."

[No Specification enrolled.]

A.D. 1825, October 6.—N° 5259.

MARTINEAU, John, the younger, and SMITH, Henry William.—" Improvements in the manufacture of steel," or alloyed steel, called " meteor steel." — (*A communication*). — A powder, called " meteor powder," is made by melting in a crucible 24 parts of zinc, 4 parts of purified nickel, and 1 part of silver; the melted mixture is granulated by pouring it into water, and is ground to a powder. Eight oz. of the ground powder are mixed with 24 lbs. of blister steel, or other steel, 6 oz. of pounded chromate of iron, 1 oz. of charcoal powder, 2 oz. of quicklime, and 2 oz. of porcelain clay, and melted in a crucible. The quantity of charcoal to be used is varied according as a hard or soft steel is required. The result is, a steel which has a wavy appearance on the surface. When it is polished it is rubbed over with an acid by preference one part of nitric acid to 19 parts of distilled vinegar."

[Printed, 3*d*. See Repertory of Arts, vol. 3 (*third series*), p. 205; London Journal (*Newton's*), vol. 12, p. 362; Register of Arts and Sciences, vol. 2 (*new series*), p. 75; Engineers and Mechanics' Encyclopædia, vol. 1, p. 791.]

A.D. 1825, November 12.—N° 5291.

PARKER, Samuel, and HAMILTON, William Francis.— "A certain alloy or alloys of metals." An alloy resembling gold, and called mosaic gold, is made by mixing copper and zinc in certain proportions, as from 52 to 55 parts of zinc, with 48 or 45 parts of copper. The copper is fused at the lowest temperature at which it will fuse, and an equal quantity of zinc is then added to it, and the mixture is stirred; a small portion of the metal is then taken and examined, and, if requisite, more zinc is added in small quantities, until the exact quantity has been added, which will give the alloy its proper goldlike appearance. The mixture is then immediately poured from the melting vessel, and run into an ingot. By adding zinc the yellow colour becomes "purplish " or lilac, and approaches to whitishness."

[Printed, 3*d*. See Repertory of Arts, vol. 3 (*third series*), p. 248; London Journal (*Newton's*), vol. 11, p. 314; Register of Arts and Sciences, vol. 4, page 41.]

A.D. 1826, June 13.—N° 5378.

KNOWLYS, Thomas John.—"A new manufacture of orna- " mental metal or metals." An alloy is formed by mixing silver, ½ oz.; fine copper, 3 oz.; and lead, 5 oz.; the two former are melted in a crucible, and lead is added by degrees, and stirred with wood. 1½ lbs. of sulphur, and ½ oz. of sal ammoniac, are added gradually. The mixture is well stirred, and the sulphur volatilised; it is then poured into a vessel whose bottom is strewed with about an oz. of sulphur; the vessel is then closed to keep in the fumes. The alloy, when cool, is broken into pieces, remelted, and cast in ingots. The alloy is used for filling up patterns or ornamental figures, engraved, etched, or stamped in surfaces of gold or silver. It is pulverised, made up in a paste, with sal ammonia and water, and placed on the surface to be ornamented and fused by the common process used by enamellers.

[Printed, 3*d*. See Repertory of Arts, vol. 4 (*third series*), p. 305; London Journal (*Newton's*), vol. 14, p. 38; Register of Arts and Sciences, vol. 1 (*new series*), p. 184.]

A.D. 1826, November 9.—N° 5422.

THOMASON, Edward.—"An improved mode of making medals and coins." Medals made of the usual metals or alloys

are surrounded by a ring or band of the precious metals. The centre part is formed separately as of copper, plated in the usual way, and the silver or gold ring or hand is attached thereto by soldering them, so as to cover the edges of the plated metal.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 14, p. 373; Register of Arts and Sciences, vol. 2 (*new series*), p. 70.]

A.D. 1826, December 13.—N° 5428.

HARSLEBEN, Charles. — "Machinery for facilitating the "working of mines, and for facilitating the extraction of diamonds "and other precious stones, gold, silver, and other metals, from "the ore, the earth, or the sand," &c. The ores, or matrices, or other substances containing the metals or precious stones are first pounded or crushed. The pounded materials are then placed in a tub or vessel with water, a rapid rotating motion is given to the vessel at the same time that its contents are well stirred. The centrifugal action of the particles separates them according to their different densities.

Suitable apparatus is described for drawing off and supplying water, and sifting and separating the various substances.

[Printed, 1*s*. See Repertory of Arts, vol. 6 (*third series*), p. 205; London Journal (*Newton's*), vol. 2 (*second series*), p. 79; Register of Arts and Sciences, vol. 1 (*new series*), pp. 225, 243; Engineers' and Mechanics' Encyclopædia, vol. 2, pp. 49, 163.]

A.D. 1827, February 20.—N° 5467.

JEFFERIES, William.—"Improvements in calcining, or roast-"ing and smelting, or extracting metals and semi-metals from "various kinds of ores and matter containing metals or semi-"metals." The ores containing the metals and semi-metals are pulverised and mixed with coal pounded or broken small. The metallic ores and coal are put into a cokeing oven and coked. The mass is then withdrawn and broken up, and the mixed coke and calcined ores are melted in an ordinary furnace. Coals which contain the least amount of sulphur are preferred.

[Printed, 3*d*. See Repertory of Arts, vol. 5 (*third series*), p. 257; London Journal (*Newton's*), vol. 1 (*second series*), p. 352; Register of Arts and Sciences, vol. 2 (*new series*), p. 66; Engineers and Mechanics' Encyclopædia, vol. 1, p. 756.]

A.D. 1827, March 27.—N° 5478.

MORNAY, Aristides Franklin.—"Improvements in prepar-"ing for smelting and in smelting ores and other substances

"containing certain metals, or in extracting such metals from "such ores and substances."—(*A communication.*)—The ores are first broken, then washed on a vibrating table, which is so constructed that water is conducted to the mass of pounded ores when they are in motion, and causes them to fall separately, according to their various densities.

The ores are smelted in a blast furnace, and are fed in from the top with the fuel. The operation is carried on without cessation. Additional charges are introduced at the top of the furnace as the melted metal is run out from below.

[Printed, 4*d*. See Repertory of Arts, vol. 7 (*third series*), p. 260; London Journal (*Newton's*), vol. 3 (*second series*), p. 157; Register of Arts and Sciences, vol. 3 (*new series*), p. 147.]

A.D. 1827, April 28.—N° 5492.

SOMERS, BENJAMIN.—"Improvements on furnaces for smelt-"ing different kinds of metal ores and slaggs." The furnace is formed of the slag of ore in which an iron pan is set in a suitable position, the slag being beaten hard around the pan. Two holes are made in the pan for running off the metal.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 2 (*second series*), p. 24; Register of Arts and Sciences, vol. 3 (*new series*), p. 165.]

A.D. 1827, October 11.—N° 5551.

HALL, JOSEPH, and HALL, THOMAS.—"An improvement in "the making and manufacturing of metallic cocks for drawing "off liquids" of an alloy of lead. The cocks are cast of lead or a composition of lead and antimony or other metal. An ounce of antimony or 3 oz. of zinc may be advantageously combined with a pound of lead. The parts "of the cylinder and piston which "work in contact" are made of brass, bell or other hard metal, soldered or tinned on to the other parts.

[Printed, 3*d*. See Repertory of Arts, vol. 8 (*third series*), p. 10; London Journal (*Newton's*), vol. 2 (*second series*), p. 23; Mechanics' Magazine, vol. 10, p. 191; Register of Arts and Sciences, vol. 2 (*new series*), p. 373.]

A.D. 1828, February 21.—N° 5621.

BRUNTON, WILLIAM.—"Improvements on furnaces for the "calcination, sublimation, or evaporation of ores, metals, and "other substances." A circular furnace is described, having a cast-iron bottom, which is made to turn round a centre vertical

shaft. The ores and metallic substances required to be calcined are broken small and placed on the rotating bottom. Fixed scrapers are used for mixing and moving the calcined materials, and pushing them from the bottom into a receptacle placed underneath as the bottom is turned round.

Heat is applied by means of a fireplace situated on one side of the furnace, while the flue may be at the other. The roof of the furnace is a flat arch or dome, in it is a hole, through which the fuel and charge may be fed from a suitable feeding hopper.

[Printed, 4*d*. See Repertory of Arts, vol. 8 (*third series*), pp. 159, 159; London Journal (*Newton's*), vol. 3 (*second series*), p. 320.]

A.D. 1828, June 12.—N° 5665.

STRACHAN, WILLIAM.—"An improvement in the making or "manufacturing of alum." The liquid sulphate of iron, or the copperas obtained in the manufacture of copperas from sulphuret of iron or common pyrites, is mixed with aluminous clays or shales. The mixture is placed in suitable furnaces or calcining kilns and calcined, and the products obtained are dissolved in water in the usual way.

[Printed, 4*d*. See Repertory of Arts, vol. 8 (*third series*), p. 519; London Journal (*Newton's*), vol. 5 (*second series*), p. 266; Register of Arts and Science, vol. 3 (*new series*), p. 24.]

A.D. 1828, July 17.—N° 5676.

JONES, JOSEPH.—"An improvement in certain parts of the "process of smelting or obtaining metallic copper from copper "ore." Copper ore is melted, and by the ordinary process is brought into the state of "regule regulus or coarse metal." It is then mixed or melted with crude copper ore that has not previously melted, the ore not being a sulpuret, or having been deprived of its sulphur by calcination. The regule, when melted with the ore, should form as nearly as possible "pure sulphuret of "copper, which is a compound of 78 or 80 per cent. of copper "with 22 or 20 per cent. by weight of sulphur."

A reverberatory furnace, about 11 feet long and 7 or 8 feet broad, may be used for operating upon about a ton of regule with the necessary quantity of ore. 5 or 6 charges may be melted in a day. The operation "facilitates the separation of iron sulphur

" and other impurities from copper ores," and economises fuel which would be otherwise required for calcination.

[Printed, 4*d*. See Repertory of Arts, vol. 1 (*new series*), p. 18; London Journal (*Newton's*), vol. 6 (*second series*), p. 21.]

A.D. 1829, February 5.—N° 5768.

BURGIS, JOHN.—"A method or methods of gilding or silvering " certain woven fabrics in burnished or burnished and dead or " matted gold or silver lace bordering, and for other purposes." Thread and woven fabrics are covered with leaf gold or silver, and made to resemble gold or silver lace.

The thread or fabric is stretched between rollers and brushed with suitable size laid on in several coats, as described.

The leaf is brushed and well cleansed and burnished.

[Printed, 1*s*. 4*d*. See London Journal (*Newton's*), vol. 8 (*second series*), p. 183.]

A.D. 1829, April 23.—N° 5782.

COOK, BENJAMIN.—"An improved method of making rollers " or cylinders of copper and other metals, or a mixture of metals, " for printing of calicos, silks, cloths, and other articles." A hollow ingot of copper or other metal or alloy is made to cover a mandril of an elliptical shape, and so form its external shell. The end of the mandril being introduced into the hollow ingot, the two are forced through holes or draw plates in a draw bench or other suitable machine, so as to draw the tube or cylinder to the required size.

[Printed, 3*d*. See Repertory of Arts, vol. 9 (*third series*), p. 391; London Journal (*Newton's*), vol. 4 (*second series*), p. 133; Register of Arts and Sciences, vol. 4 (*new series*), p. 124.]

A.D. 1830, January 28.—N° 5892.

REVERE, JOHN.—"A new alloy or compound metal applicable " to the sheathing of ships and various other useful purposes." To form an alloy suitable for sheathing ships, 95 parts of zinc are combined with 5 parts of copper. The metals are melted in separate vessels, and mixed; the surface of the molten metal is covered

with powdered charcoal or salt to prevent the combustion of the zinc. The alloy is cast in ingots and rolled.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 5 (*conjoined series*). p. 119; Register of Arts and Sciences, vol 5 (*new series*), p. 98.]

A.D. 1830, February 4.—N° 5895.

GRAY, John.—" A new and improved method of preparing and " putting on copper sheathing for shipping." Punching apparatus, and templates for preparing metallic sheathing for being applied to ships' sides, are described with drawings. The holes for the nails are punched, and indentations are made in the sheets to receive the heads of the nails.

[Printed, 7*d*. See Repertory of Arts, vol. 9 (*third series*), p. 292; London Journal (*Newton's*), vol. 2 (*conjoined series*), p. 30; Register of Arts and Sciences, vol. 4 (*new series*), p. 292.]

A.D. 1830, April 28.—N° 5935.

PETHERICK, Thomas.—" Certain machinery for separating " copper, lead, and other ores from earthy and other substances," &c. The machinery is intended to replace that used in the ordinary "jigging" process. A large tub or vessel is described, with drawings. It has a fixed cover, in which are apertures and receptacles adapted to receive a number of sieves, used for separating the metallic ores from earthy matters. The sieves are so arranged that when the vat is filled with water they are immersed therein. The vat communicates with a hollow cylinder, in which works a piston, by means of which water is alternately forced into and withdrawn from the vat and sieves. The contents of the sieves are thereby washed and separated. Suitable apparatus is used for removing the earthy impurities and sorting the metallic particles.

[Printed, 9*d*. See Repertory of Arts, vol. 10 (*third series*), p. 337; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 298; Register of Arts and Sciences, vol. 5 (*new series*), p. 197; Engineers and Mechanics' Encyclopædia, vol. 2, p. 162.]

A.D. 1830, July 6.—N° 5952.

UZIELLI, Matthew.—" Improvements in the preparation of " certain metallic substances, and the application thereof to the " sheathing of ships and other purposes.—(*A communication.*)—

An alloy, to be used for sheathing ships, is formed by mixing about 100 parts of copper with 5 to 7 parts of tin.

Lead and zinc in very small proportions may be mixed therewith.

The alloy is cast by running it between two strong tables of granite, so as to form plates $\frac{3}{8}$ to $\frac{3}{4}$ inch thick.

The plates are made malleable by the repeated operations of annealing and cold rolling, with a slight pressure.

The operation should be repeated 12 or 15 times, then the plates may be cut into strips and rolled out into sheets for sheathing.

[Printed, 3*d*. See Repertory of Arts, vol. 11 (*third series*), p. 269; London Journal (*Newton's*), vol. 7 (*second series*), p. 280; Register of Arts and Sciences, vol. 5 (*new series*), p. 272.]

A.D. 1830, July 26.—N° 5963.

ROBERTS, Samuel.—" Improvements in plating or coating of " copper or brass, or mixture of the same, with other metals or " materials, with two metals or substances upon each other," &c. These consist in introducing a layer of German silver or other white metal alloy between silver and the copper, brass, or other metal on which it is usually plated, so that when the silver wears away the defect is not very perceptible, owing to the similarity in colour of the alloy to that of silver.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 8 (*second series*), p. 24; Register of Arts and Sciences, vol. 5 (*new series*), p. 165.]

A.D. 1830, October 20.—N° 6018.

COCHRANE, Sir Thomas.—" Apparatus to facilitate excavating, " sinking, and mining shafts." In sinking shafts or excavating for ores near rivers on the sea, where there is difficulty from the influx of water, air-tight compartments are used. These are connected with pneumatic apparatus, and are supplied with valve doors and compressed air, so that workmen may be able keep out water and excavate earth or obtain minerals or ores.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 7 (*conjoined series*), p. 304; Register of Arts and Sciences, vol. 6 (*new series*), p. 82.]

(This Specification was referred to in the case of Bush *v.* Fox, tried before Pollock, C.B., December 22, 1852, and carried on appeal to the Exchequer Chamber and the House of Lords. It was held that as Sir T. Cochrane had described in his Specification the use of air-tight compartments supplied with compressed air to enable workmen to sink shafts on land, Mr. Bush could not have a Patent for similar apparatus used for building foundations under water.—Macrory's Pat. Cases, vol. 1, pp. 152 to 184.)

A.D. 1830, November 1.—N° 6024.

COOK, BENJAMIN.—"An improved method of making a neb "or nebs, slot or slots, in shells or hollow cylinders of copper, brass, "or other metals, or mixture of metals, for printing of calicos, "muslins, cloths, silks, and other articles." The invention relates to the use of a cutting instrument or machine for removing the necessary metal from the interior of printing cylinders made of copper or other metals or alloys, and leaving nebs or slots which enable the cylinder to be firmly attached to its mandril.

[Printed 5d. See London Journal (*Newton's*), vol. 8 (*conjoined series*), p. 411; Register of Arts and Sciences, vol. 6 (*new series*), p. 79.]

A.D. 1830, November 4.—N° 6031.

BOMPAS, GEORGE GWINNETT.—"An improved method of "preserving copper and other metals from corrosion or oxyda- "tion." Copper and other metals and their alloys are preserved from oxydation, and rendered suitable for sheathing ships, using such combinations of metals as will in sea or saline waters just neutralise the corrosive action of the sea water by causing a slight galvanic action. From 90 to 200 parts of zinc alloyed with 100 parts of copper may be used for sheathing. If the copper be "impure and more positive in proportion" more zinc will be required. Where the sea water acts with less energy the proportion of zinc must be increased. From 50 to 150 parts of lead may be alloyed with 1 part of tin to protect lead, or 50 to 150 parts of tin with 1 part of zinc to protect tin. From 10 to 150 parts of tin, and 1 of zinc, will protect iron.

The exact proportions to be used are not essential, and must be varied according to circumstances. The metal in some cases, "as in sheathing ships, has a tendency to become foul, so as to "compensate the advantages obtained by its protection from cor- "rosion." The nails or rivets employed must have the same galvanic character as the sheathing.

[Printed, 4d. See Repertory of Arts, vol. 16 (*third series*), p. 338; London Journal (*Newton's*), vol. 1 (*conjoined series*), p. 418; Register of Arts and Sciences, vol. 6 (*new series*), p. 84.]

A.D. 1830, November 27.—N° 6040.

REVERE, JOHN.—"A new and improved method of protecting "iron chain cables, iron boilers, and iron tanks, from the corro-

" sion produced upon them by the action of water." Strips of zinc, or zinc alloyed with small proportions of other metals, as copper, iron, tin, lead, or nickel, are attached to surfaces of iron, which require protection from water. The surface of the zinc should be to the surface of the protected metal as 5 to 100. The zinc strips or plates may be attached by rivets or soldered.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 320; Mechanics' Magazine, vol. 15, p. 92; and Register of Arts and Sciences, vol. 6 (*new series*), p. 17.]

A.D. 1831, July 6.—N° 6129.

WETTERSTEDT, Baron CHARLES.—" A composition or com- " bination of materials for sheathing," &c. for ships. An alloy, which may be used for sheathing ships, is formed by melting 100 parts of lead with 3 to 10 of regulus of antimony. The mixture is stirred and skimmed, and cast in plates about 16 inches by 8½ and ½ inch thick. These are flatted by rolling them, and are then rubbed on both sides with an amalgam, which is made by melting two parts lead with one part of antimony metal, and adding to the mixture, just before it sets, 17 parts of quicksilver, heated to about 300° or 400° F. The sheets so prepared are again flatted by rolling them. The skimmings from the mixture may be used as a protective paint.

[Printed, 3*d*. See Repertory of Arts, vol. 13 (*third series*), p. 139; London Journal (*Newton's*), vol. 1 (*conjoined series*), p. 421, and vol. 10 (*conjoined series*), p. 179; Mechanics' Magazine, vol. 17, p. 381; and Register of Arts and Sciences, vol. 7 (*new series*), p. 11.]

A.D. 1832, March 8.—N° 6239.

PETHERICK, THOMAS, and KINGSTON, JOHN FILMORE.— " Improvements in machinery and apparatus for separating " copper, lead, and other ores from earthy and other substances " with which they are or may be mixed." The specification of former Letters Patent of April 28, 1830 (see No. 5935, p. 66,) is referred to. The machinery therein described is improved by providing the piston and cylinder used for introducing water into the washing vat with suitable valves, so as to make the piston act as a single acting pump, and force the water through the sieves containing the metallic substances. The sieves are fixed in the lid of the vat and the water escapes over the upper edges into a suitable reservoir, whence it can be again drawn up and injected into the vat. Or the water may be introduced into the vat from

a reservoir situated above it, so that it enters under the requisite pressure.

[Printed, 1s. 5d. See Repertory of Arts, vol. 14 (*third series*), p. 209, London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 278; Register of Arts and Sciences, vol 7 (*new series*), p. 292; and Engineers and Mechanics' Encyclopædia, vol. 2, p. 162.]

A.D. 1832, April 13.—N° 6260.

COOK, BENJAMIN.—"An improved method of manufacturing "various useful articles from a metal not hitherto used for that "purpose." The invention claimed merely consists in applying zinc, the metal referred to, in the manufacture of a variety of articles, such as spoons, ladles, cups, ornaments, locks, &c. The zinc is rolled into sheets, and stamped or otherwise worked up into the forms desired.

[Printed, 3d. See Repertory of Arts, vol. 14 (*third series*), p. 272; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 82.]

A.D. 1832, October 22.—N° 6325.

MUNTZ, GEORGE FREDERICK.—"An improved manufacture "of metal plates for sheathing the bottoms of ships or other such vessels." A compound metal, or alloy of copper and zinc, that will roll at a red heat, and "oxydate sufficiently" to prevent incrustations from accumulating in salt water, and be therefore suitable for sheathing ships, is thus formed:—"Best selected copper" and "foreign zinc" are melted together, in proportions of 50 up to 63 per cent. of copper, with 50 down to 37 per cent. of zinc; 60 copper and 40 zinc are the proportions recommended. The metal is cast in ingots and rolled hot, and when finished are annealed and "pickled" in sulphuric acid and water, and afterwards washed in water. Copper mixed with calamine, or brass with zinc, the metals being present in necessary proportions, may be used.

[Printed, 3d. See Repertory of Arts, vol. 15 (*third series*), p. 325, and vol. 17 (*new series*), p. 116; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 212, vol. 19 (*conjoined series*), p. 460, vol. 21 (*conjoined series*), p. 468, and vol. 24 (*conjoined series*), pp. 297, 299; Mechanics' Magazine, vol. 39, p. 367, and vol. 40, p. 111; Record of Patent Inventions, vol. 1, p. 339; Carrington and Kirwan's Reports, vol. 3, p. 297; Dowling and Lowndes' Reports, vol. 1, pp. 24, 737; and Jurist, vol. 7, p. 121.]

(These Letters Patent were the subject of long litigation, which terminated in the validity of the Letters Patent being established on the ground, that the specific metals ("best selected copper" and "foreign zinc") were to be combined in ascertained proportions (about 60 copper with 40 zinc), which gave a successful result that was not known before the date of the Patent. The Letters Patent of W. Collins (see ante, p. 36, No. 2390) were referred to in the proceedings, and were held not to have anticipated Mr. Muntz.)

A.D. 1832, November 20.—N° 6336.

PERKINS, JACOB.—"An improvement in preserving copper in "certain cases from the oxydation caused by heat." An alloy composed of $\frac{2}{3}$ of copper and $\frac{1}{3}$ zinc, melted together, is used for a protecting coating for the surfaces of copper tubes or other articles, which are exposed to the action of fire. The melted alloy is applied to the heated surface of the copper by bringing them into close contact, and employing the usual means and fluxes for causing the coating to adhere.

[Printed, 3d. See Repertory of Arts, vol. 16 (*third series*), p. 11; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 85.]

A.D. 1832, December 17.—N° 6347.

MUNTZ, GEORGE FREDERICK.—"An improved manufacture of "bolts and other the like ships' fastenings." An alloy composed of "best selected copper" and "foreign zinc," combined in the same proportions employed by the patentee for making his sheathing metal (see ante, No. 6325, p. 70) is used for making bolts and rivets and fastenings for ships. From 50 up to 63 per cent. of copper may be used with from 50 down to 37 per cent. of zinc, as within these limits the metal will roll hot and oxydate sufficiently to keep the surface of the metal clean in sea water. The proportions recommended are about 60 copper and 40 zinc.

[Printed, 3d. See Repertory of Arts, vol. 16 (*third series*), p. 12; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 83.]

A.D. 1833, January 24.—N° 6371.

WARNER, JOHN.—"Improved processes in giving a metallic "coating to various articles of commerce." A bath of melted tin or alloy of tin, that will melt at a lower temperature than lead or the article to be coated, is employed. The surface of the metal to be coated is sprinkled with powdered resinous substance; the other parts, if any, may be protected by lamp black and size, or other substances to which the tin or alloy will not adhere. The surface of the melted tin or alloy is covered with fatty or resinous substances, and the leaden or other metallic article is coated with tin or alloy, by dipping it in the bath.

[Printed, 3d. See London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 209; Engineers and Mechanics' Encyclopædia' vol. 2, p. 797.]

A.D. 1833, June 29.—N° 6445.

BANCKS, CHRISTOPHER PIGGOTT.—" An improvement in the " manufacture of certain culinary and chemical utensils and " vessels." Vessels are composed of zinc or zinc and tin alloy, with a thin outer casing of iron, copper, or hard alloys, which will withstand the action of fire. The thin outer case of iron, or copper, or alloy, is first formed by stamping or casting, or otherwise, and is tinned on its inner surface. A core is suspended inside the case, and into the space between the core and the case melted zinc, or alloy of 10 parts zinc and one tin, is run; the zinc or alloy adheres to the tinned surface of the case, and, when cold, is finished in the usual way.

[Printed, 5*d*. See Repertory of Arts, vol. 16 (*third series*), p. 267; London Journal (*Newton's*), vol. 3 (*conjoined series*), p. 99.]

A.D. 1833, October 28.—N° 6497.

PATTINSON, HUGH LEE.—" An improved method of separa- " ting silver from lead." Silver is easily and cheaply separated from lead by the following process:—When lead containing silver is slowly heated or cooled it divides itself at a certain temperature into two portions, the fluid portion in which the silver is contained, and the set or solid part, or partially set part, which is deprived of its silver. To separate the part containing the silver, a charge of lead is melted and allowed to cool slowly in a suitable vessel, as the fluid mass congeals; the parts which congeal on the sides of the vessel are broken off and mixed with the fluid, until solid particles resembling crystals begin to form on the surface. These sink to the bottom, and are removed by a perforated ladle, and the fluid portion is entirely drained from them; these solid parts will then contain no silver. The fluid portion, which retains the silver, is refined, and is operated on in the usual way to separate the silver.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 9 (*conjoined series*), p. 298; Engineers and Mechanics' Encyclopædia, vol. 2, p. 670.]

A.D. 1834, February 13.—N° 6555.

MARR, WILLIAM.—" An improved method of making and " manufacturing of all kinds of copper, iron, tin, and other metal " safes, and boxes, and repositories, with metal and mineral and

" other means, so as to afford the most perfect security against " fire to deeds, documents, and property contained therein." A double case is formed of copper, iron, or other metal; the inner surface of the outer shell, and the outer surface of the inner shell, are covered with sheet mica or talc. Between the two shells, powdered clay or some suitable non-conductor of heat is placed so as to closely fill up all the space.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 121.]

A.D. 1834, February 15.—N° 6557.

GRIFFITHS, THOMAS.—" Improvement in the manufacture of " tea-kettles and other articles then usually made of copper, " copper tinned or plated, iron tinned, or any other metal or " metals." Articles are made of copper or other metals in a hollow form by a repetition of the process of stamping and annealing, and then burnishing them in a turning lathe. The parts of the title and specification relating to plated copper or other metals were disclaimed, as the process described had been previously applied to forming hollow vessels of plated copper, and the alloy called Britannia metal.

[Printed, 1*s*. 8*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 348.]

A.D. 1834, April 17.—N° 6594.

WILLIAMS, WILLIAM, and HAY, THOMAS.—" Improvements " in preparing certain metals applicable to the sheathing of the " bottoms of ships and other purposes." Sheet zinc is coated with tin, and may be used for sheathing ships or roofing buildings. The sheet zinc is pickled in acid and water, cleansed with tow and sand, and well washed; it then is dipped in heated oil and melted fat, and afterwards in a bath of melted tin, which is kept at as low a temperature as the tin will fuse. After being tinned it is again dipped in heated oil or fat, then laid flat on a bench or plate, and well rubbed with dry bran and hemp. The plates may be tinned by laying them upon a suitable table, having a rim or ledge, and pouring molten tin thereon.

[Printed, 5*d*. See Repertory of Arts, vol. 3 (*new series*), p. 290; London Journal (*Newton's*), vol. 7 (*conjoined series*), p. 130.]

A.D. 1834, November 25.—N° 6724.

SLADE, Jacob Tilton.—"An improved metallic sheathing "for the bottoms of ships and vessels." A compound plate formed by uniting a sheet of copper by means of a tinned surface to a sheet of lead is used for sheathing ships. The sheet of copper is tinned on one side, and the other side is covered with protecting coating, as paste of clay and flour. The copper sheet is then dipped in a bath of molten lead and tin alloy, the proportion of tin being no more than will insure adhesion between the lead and the copper. The sheet is next laid upon a suitable table or mould formed of a plate of iron, and covered with another plate of iron. Molten lead is poured upon the sheet through holes in the upper iron plate until the ead is sufficiently thick.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 15.]

A.D. 1835, June 22.—N° 6853.

MICHELL, James.—"An improved process in smelting argen"tiferous ores." Successive charges of argentiferous ores are "fused with a sulphuret produced by a previous charge," both being "free or nearly free from sulphur and arsenic, in admixture "with sulphur or with iron pyrites, till sufficient silver is con"centrated." If the ores contain sufficient sulphur, successive charges are "reduced and concentrated by the smelting of the first "charge of the furnace."

[Printed, 3*d*. See Repertory of Arts, vol. 5 (*new series*), p. 90; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 194.]

A.D. 1835, December 22.—N° 6965.

TROUGHTON, Nicholas.—"Improvements in the proces "of obtaining copper from copper ores." The fumes and vapours driven off from copper ores during the process of calcination and working, are separated from the gases and fumes given off by the fuel used; they are collected apart, and are purified and condensed by washing them, so as to prevent their passing into, and so contaminating the atmosphere. Suitable furnaces, having flues and condensing chambers and cisterns, and blowing and exhaust apparatus connected with them, are described.

[Printed, 3*d*. See Repertory of Arts, vol. 10 (*new series*), p. 289; London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 315.]

A.D. 1836, June 24.—N° 7134.

ELKINGTON, George Richards.—" An improved method of " gilding copper, brass, and other metals or alloys of metals." The metals are gilded "by means of potash or soda combined " with carbonic acid and with a solution of gold." 5 oz. troy of pure gold are disolved in 52 oz. avoirdupois of nitro-muriatic acid, formed by mixing 21 oz. of nitric acid, 1·45 specific gravity, and 17 oz. of muriatic acid, 1·15 specific gravity, and 14 oz. of distilled water. The clear solution is poured off and added to 4 gallons of distilled water, with which are mixed 20 lbs. of best bi-carbonate of potash; the mixture is boiled for two hours. The articles to be gilded are dipped into the solution while it is hot.

[Printed, 3d. See Repertory of Arts, vol. 8 (*new series*), p. 223; London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 99.]

A.D. 1836, November 24.—N° 7234.

ELLIS, Thomas, and BURR, Thomas.—" Improvements in the " manufacture of sheets and pipes or tubes and other articles of " lead and other metal." The specification of prior Patent (see N° 4445, ante p. 53,) is referred to as describing the invention on which the improvements are based.

Lead pipes are drawn by forcing them through dies, and are cut open so as to form sheets.

The pipes are coated with tin at the same time that they are manufactured, by forcing the pipes through a bath of tin immediately on their issuing from the dies.

[Printed, 6d. See Repertory of Arts, vol. 8 (*new series*), p. 31; London Journal (*Newton's*), vol. 11 (*conjoined series*), p. 6.]

A.D. 1837, January 11.—N° 7272.

ADCOCK, Henry.—" Improvements in the construction of the " furnaces employed in the reduction of iron ores and other " metallic ores, as also in some of the processes of the iron manu- " factures, and of the manufacture of other metals, such furnaces " being applicable to other purposes." A furnace in the form of an inverted cone is employed for smelting ores. The chimney is connected by means of a flue with the lower part of the furnace; the fumes and gases given off are conducted thereto, and after-

wards passed back into the furnace. Artificial blasts are dispensed with, a hollow space or chamber is made at the bottom of the cone to receive the melted metal and scoria.

[Printed, 3*d.*]

A.D. 1837, February 17.—N° 7304.

ELKINGTON, HENRY.—"Improvements in covering or "coating certain metals with platina, and also improvements in "gilding certain metals, and in apparatus used in such processes." Platina is disolved in a mixture of "nitro-muriatic acid, composed "of equal parts of nitric acid, pur (sp. gr. 1·45) and muriatic "acid, pur (sp. 1·15)." 10 ozs. of each acid will together dissolve 1 oz. of platina. A gentle heat is applied, and the solution is reduced one half by evaporation. To an oz. of platina, thus dissolved, 3 quarts of pure water are added, and 3 lbs. of bi-carbonate of soda are boiled therewith and dissolved.

Articles of brass or copper dipped in the solution undergo no change, but if a solution of gold (1 oz. dissolved in 6 ozs. of the nitro-muriatic acid) be added, the articles will be coated with platinum or platinum alloyed with gold. The gold may be dissolved and combined with potash, and platinum be added thereto, to form a solution.

Articles coated with platinum may be gilt by dipping them in the nitro-muriatic solution of gold, or by applying the solution, by a brush or otherwise, to the parts required to be coated.

Articles may be gilded by first dipping them in a solution of mercury dissolved in nitric acid, 3 or 4 dwts. of mercury in solution are boiled with a quart of water, and 3 lbs. of carbonate of potash. The articles so dipped in the mercury solution become coated therewith, and are then washed and dipped in the nitro-muriatic solution of gold, and the operations are repeated until the coating is sufficiently thick; the mercury is then expelled by applying heat (or by the "heightening process").

[Printed, 6*d.* See Repertory of Arts, vol. 8 (*new series*), p. 354; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 246.]

A.D. 1837, April 29.—N° 7355.

CRAUFURD, HENRY WILLIAM.—"Improvement in coating "or covering iron and copper for the prevention of oxidation.'

The articles are pickled in acidulated water, and coated by dipping them in a bath of melted zinc. If too much zinc adheres to the surface, the excess is driven off by heating the articles in a suitable furnace.

Zinc may be ground to powder and mixed with the usual substances to form a protecting paint.

The articles may receive a second coating by dipping them in a bath of melted tin, or alloy of ⅓ tin and ⅔ lead.

[Printed, 5d. See Repertory of Arts, vol. 9 (*new series*), p. 289; London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 65, vol. 24 (*conjoined series*), p. 457; and vol. 21 (*conjoined series*), p. 478, for disclaimer Hindmarch on Patents, pp. 293 and 430; Rolls Chapel Reports, 7th Report p. 186.]

A.D. 1837, May 8.—N° 7367.

STEINKELLER, Peter.—" Certain plates or tiles made of zinc " or other proper metal or mixtures of metals applicable to roofs " or parts of buildings."

[No Specification was enrolled.]

A.D. 1837, December 4.—N° 7495.

BOOKER, Thomas William.—" Improvements in preparing " iron to be coated with tin and other metals." The acid or pickling mixture is used heated, it is contained in a leaden vessel, which is placed in an outer casing of iron, the space between the two being filled with water and heated by a furnace. The plates to be tinned are placed on their edges in a rack or frame, and are so kept apart, and dipped and pickled.

[Printed, 6d. See Repertory of Arts, vol. 10 (*new series*), p. 80.]

A.D. 1837, December 4.—N° 7496.

ELKINGTON, Henry.—" Improvements in gilding and silver- " ing certain metals, and also for improvements in certain vessels " or apparatus used in such processes, and for other purposes." Articles are gilded by dipping them in a nitro-muriatic solution of gold, boiled with chloride of sodium and borax.

The gilt articles are deadened by using " deading acquafortis." A silvering solution is formed by dissolving silver in nitric acid and precipitating it as a chloride of silver and adding chloride of sodium. The chloride of silver is dissolved in nitric acid and boiled.

2 parts of carbonate of soda or potash, 2 parts of fine clay, and 8 parts of fine sand, are made into a creamy paste with water, and applied as a coating to the inside of metallic vessels, the paste is dried and fluxed by applying heat. A vitreous enamel is superadded thereto in the ordinary way.

[Printed, 4*d.* See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 75.]

A.D. 1837, December 9.—N 7502.

MILLS, SAMUEL.—" Improvements in machinery for rolling " metals." Rolls are described, with drawings, having part of their working surfaces cut away, so that the pinch or pressure is operative only at the points desired. Bars or sheets of metal may be rolled of taper shape or varying thickness.

[Printed, 8*d.* See Repertory of Arts, vol. 10 (*new series*), p. 96.]

A.D. 1838, January 5.—N° 7531.

WATT, CHARLES, and TEBBUTT, THOMAS RAINFORTH.— " Improvements in the manufacture of the oxides of lead, and " also of the carbonate of lead." Metallic lead is converted into a protoxide in the usual way; it is then boiled with the chloride of potassium, sodium, or barium. The chloride of lead thus obtained is mixed with ordinary red lead, and heated in a suitable retort, with sulphuric acid, or with nitric acid, and afterwards combined " with alkaline or earthy carbonates," as described, to from carbonate of lead.

[Printed, 4*d.* See Repertory of Arts, vol. 10 (*new series*), p. 108. London Journal (*Newton's*), vol. 13 (*conjoined series*), p. 263.]

A.D. 1838, January 30.—N° 7555.

FLUDE, CHARLES.—" Improvements in applying heat, &c., for " smelting and otherwise working ores, metals, and earths." Furnaces are described, with drawings, so constructed that the fireplaces form coking ovens. The heat generated by the burning of small coal is applied to working metals or other purposes, at the same time that coke is produced.

[Printed, 10*d.* See London Journal *Newton's*), vol. 19 (*conjoined series*) p. 352.]

A.D. 1838, May 3.—N° 7630.

BERRY, Miles.—"A new and improved method or process of "alloying metals by cementation, particularly applicable to the "preservation of copper, wrought or cast iron, and other metals, "and thereby operating a change in the appearance of their "surface, and giving them more brilliancy."—(*A communication.*) Metals are alloyed or changed by a process of cementation, so as to "resist the action of air, humidity, or certain acids."

1st. Copper is well cleansed, and is "placed in a furnace covered "with a mixture of charcoal and zinc." The temperature is raised to a cherry red, and maintained for the length of time necessary to effect the deposit required, which is determined by trial or the experience of the workmen.

2nd. Iron well cleansed is dipped in a mixture 2 parts zinc and 3 parts copper, melted in a crucible, and covered with a layer of salammoniac, rosin, borate of soda, or other suitable substances. If the iron is bulky it should be heated; or the iron may be first dipped in "a boiling solution of salammoniac or borate of soda."

The prepared iron is next "put in a layer of charcoal powder in a furnace, and exposed to a strong red heat, until the fumes of zinc begin to abate." The iron should be then removed, and plunged with its covering of charcoal into water, or be allowed to cool slowly.

Or the mixture of zinc and copper may be used in a pulverised form mixed with borax. The iron is smeared with fat or unctuous substances, or wetted with water, and then dipped into the pulverized mixture, and heated with charcoal in a furnace, as above described.

Or iron may be coated with copper by dipping it in a solution of sulphate of copper, then be covered with a layer of pulverised zinc, made in a paste with borate of soda or other suitable substances, and clay and water, and heated with charcoal in a furnace. The colour imparted to the metal will be golden or silvery, according to the length of the operation, and the quantity of zinc combined with thecopper.

The brightness of gold alloy is enhanced by rubbing it with vegetable charcoal or soot and nitric acid. Pulverised calamine may be used instead of zinc.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 91.]

A.D. 1838, May 5.—N° 7635.

FONTAINEMOREAU, PETER ARMAND LE COMTE DE.—"An "improved method of preventing the oxidation of metals."—(*A communication.*) Metallic articles are coated with zinc by first cleansing and pickling their surfaces. They may then be deposited in lime water or other alkaline solution, until they are dipped in a bath of melted zinc. Or zinc may be applied to metallic surfaces in the form of dried powder, and attached thereto by applying heat. Zinc sheets are attached to sheets of other metals by applying salammoniac, and passing the sheets through heated rollers. "Alloys composed of zinc and tin, or lead or bismuth "or quicksilver," melted in a suitable crucible, are used for coating metallic surfaces.

[Printed, 4*d.* See Repertory of Arts, vol. 11 (*new series*), p. 169; also vol. 12 (*new series*), p. 46; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 299.]

A.D. 1838, May 31.—N° 7662.

DUCLOS, EDOUARD JOSEPH FRANCOIS.—"Improvements in "the manufacture of zinc, copper, tin, and antimony." When the ores of the metals are in the state of sulphurets, they are converted into sulphates by various methods of oxidation. From the sulphates so obtained, the metals are separated either by bringing them into oxides by the ordinary processes, or by those particularly described.

In manufacturing zinc, the ordinary sulphuret of zinc "blende, "or black jack," is crushed small, and mixed with hydrate of lime, and moulded into blocks or bricks. These are dried and calcined in a kiln, and then broken in pieces, and again calcined in a reverberatory furnace. The calcined mixture is then reduced in a closed blast furnace, provided with suitable condensing apparatus, as described with drawings, and metallic zinc is produced. Hot blast is used by preference. In manufacturing copper, rich as well as poor ores may be operated upon without mixing the former with the latter. A portion of the sulphur is removed by distillation in the vessels described, in which the atmospheric air is prevented from coming in contact with the metals. The heated ore is then placed in leaden vats, set on cast-iron plates, heated by flues connected with the distilling apparatus, and the sulphurets

are converted into sulphates by the introduction of steam, atmospheric air, or nitrous gas. Water is then introduced, and the sulphates dissolved; the solution is drawn off, and the process repeated.

The solutions are to be concentrated by evaporation, so as to contain about 25 or 30 per cent. of salts, and have an excess of sulphuric acid. Pure iron in a crystallized state as obtained from the pudling process, or iron scoured with acid, so as to be free from oxide, is introduced. Metallic copper is thus precipitated, it is washed and fused, and operated upon in the ordinary way.

In manufacturing tin from "stream tin" or oxide of tin, charcoal or other carbonaceous matter is mixed with the tin, and melted in retorts. When the tin ores contain sulphate of iron and other materials, they are treated by a similar process to that described before as being applied to copper ores.

In manufacturing antimony, the sulpuret ores are treated as above described for zinc.

The oxides obtained are heated in retorts with carbonaceous matter, and a suitable flux, as carbonate of soda or potash. The metal is then treated by the ordinary process.

[Printed, 1*s*. 10*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 338; Mechanics' Magazine, vol. 36, p. 476.]

A.D. 1838, June 12.—N° 7683.

HOE, Richard March.—"Improvements in machinery or "apparatus for grinding and polishing metal surfaces." The metal surfaces are fixed upon travelling beds, and are ground or polished by means of revolving lap wheels, or grinding or polishing cylinders. An alternate traversing motion is given to the wheels or cylinders across or in front of the tables, so as to change the position of the surfaces to be polished as required, as shown in the drawings.

[Printed, 2*s*. 11*d*.]

A.D. 1838, June 27.—N° 7707.

GREEN, Charles.—"Improvements in the manufacture of "brass and copper tubing." Brass or copper tubes are made without seams or soldered joints, by drawing them with a mandril inside them, through holes in a draw plate, like leaden pipes.

The tubes are afterwards annealed to restore the malleability of the metals which is taken away by the drawing operation.

A draw-bench of great power is required, a suitable one is described with drawings.

[Printed, 1*s.* 4*d.* See London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 416.]

A.D. 183 , June 27.—N° 7708.

BECKHAM, Daniel.—" An improved mode of obtaining cast-" ings in gold, silver, and albata." Instead of employing moulds of sand or loam, metal moulds, made of iron, steel, copper, or other suitable metals or alloys are used. The moulds may be made in any convenient number of parts, joined or held together in any convenient way. They should be heated before the molten metal is run into them.

Bell metal may be advantageously used for the moulds, which may be cast from original sand moulds, or be made by a process of sinking, like that of die sinking.

[Printed, 3*d.*]

A.D. 1838, July 30.—N° 7753.

HENDLEY, Robert.—" A metallic concrete, applicable to a " variety of purposes for which iron, lead, zinc, copper, and other " substances have been heretofore used." The concrete is thus formed :—Soft coal or bitumen (the quantity is not stated) is placed in a trough or vessel made of fire-brick or clay, and heated underneath; $\frac{1}{10}$ of mineral tar, by preference Stockholm tar, is added to $\frac{3}{10}$ soft coal; the heat is continued, and a substance resembling mineral caoutchouc, which is found near Castleton in Derbyshire, is formed; to this are added the following substances :—$\frac{1}{20}$ of muriate of osda or salt, $\frac{1}{20}$ black oxide of magnesia, and a quart measure of iron fillings well mixed together, and then incorporated with $\frac{2}{10}$ river sand, $\frac{1}{10}$ Devonshire spar, and $\frac{1}{10}$ granite, well pulverized. Heat is applied until the whole mixture is well melted, and incorporated to form the metallic concrete.

[Printed, 4*d.*]

A.D. 1838, August 1.—N° 7756.

HEARD, Edward.—" Improvements in oxidizing lead, and " converting the same into pigments or white and red lead," &c.

Metallic lead is melted in a reverberatory furnace, with half its weight of nitrate of soda, which is thrown in in small quantities, and stirred with the lead.

A low red heat is kept up, and in a few hours a protoxide of lead like litharge is formed.

This is cooled, ground, and placed with water in a closed vessel, and treated with currents of carbonic acid gas, until the protoxoide " is converted into carbonate of lead."

[Printed, 3*d*. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 41.]

A.D. 1838, August 7.—N° 7765.

RODDA, RICHARD.—" Improvements in furnaces," &c. for " the smelting of metals, and other purposes." Furnaces are described with drawings, which have a hollow fire bridge and side flues, so constructed that the smoke and waste gases of combustion are made " to pass through a mass of intensely burning fuel and " under a sheet of flame." The smoke and gases are thereby entirely consumed.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 392. Mechanics' Magazine, vol. 31, p 385.]

A.D. 1838, August 21.—N° 7779.

TROUGHTON, NICHOLAS.—" Improvements in the process of " obtaining copper from copper ores." Apparatus is described for roasting copper ores; closed retorts are used for collecting and separating the vapours and fumes given off by the copper ores, apart from the fumes and gases given off by the fuel used for heating. The fumes and vapours of the copper ores are collected and conducted by pipes or flues to a suitable chamber, where they may be condensed in the form of sulphur, or they may be conducted to suitable vessels, and be made to directly produce sulphuric acid.

[Printed, 3*d*. See Repertory of Arts, vol. 12 (*new series*), p. 249. London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 333.]

A.D. 1838, August 23.—N° 7781.

FONTAINEMOREAU, PIERRE ARMAND LE COMTE DE.— " Certain new and improved metallic alloys to be used in various

"cases as substitutes for zinc, cast iron, copper, and other metals." —(*A communication*).— Eight mixtures are enumerated in the specication :—

(1.)

Zinc	- 90	parts
Copper	- 8	"
Cast Iron	1	"
Lead	1	"
	100	

(2.)

Zinc	- 91	parts
Copper	- 8	"
Lead	- 1	"
	100	

(3.)

Zinc	- 92	parts
Copper	- 8	
	100	

(4.)

Zinc	- 99	parts
Cast Iron	1	"
	100	

(5.)

Zinc	- 97	parts
Copper	- 2½	"
Cast Iron	½	"
	100	

(6.)

Zinc	- 97	parts
Copper	- 3	"
	100	

(7.)

Zinc	- 99½	parts
Cast Iron	½	"
	100	

(8.)

Zinc	- 91½	parts
Copper	- 8	"
Cast Iron	½	"
	100	

Articles cast in the above alloys may be coloured by applying thereto solutions of suitable salts of copper, as hydrochlorate of copper, to which a small quantity of nitric acid may be added to give a blackish bronze hue. To give a reddish colour, liquid ammonia and acetic acid may be employed. Other shades may be given to the alloys, by combining these solutions or applying them successively.

[Printed, 4*d*.]

A.D. 1838, August 31.—N° 7793.

KEYS, John, and CLOUGH, William Thompson.—"A "method for the manufacture of sulphuric acid from copper ore,

" copper regulus, and sulphuret of zinc." The copper ore, or regulus, or sulphuret of zinc, is heated in an iron vessel. The fumes are conveyed by pipes to a suitable leaden vessel or chamber, and there is also conveyed to the vessel or chamber " such quantity " of nitrous gas as shall be found from time to time sufficient for " the due conversion of sulphurous into sulphuric acid."

[Printed, 3*d.*]

A.D. 1838, September 8.—N° 7800.

VAUCHER, James Ulric.—" Improvements in fire engines, " hydraulic machines, &c., metallic packing, &c." A mode of constructing the piston and valve chest of hydraulic machines is described. An alloy used for metallic packing is made by combining 60 lbs. of zinc, 40 lbs of tin, and 4 ozs. of regulus of antimony. Gun metal and brass are used " for the cylinders and " parts of hydraulic and other engines so packed." The metallic packing is heated and poured so as to come into contact with the surfaces to which it is required to adhere, the surfaces being also heated. The parts to which the packing is not required to adhere may be smoked with the smoke of wood or other material, or be otherwise protected.

[Printed, 7*d.*]

(The Patentee's specification was given in evidence in the case of Newton v. Vaucher tried before Baron Platt at Liverpool, 35th June, 1852. It was contended that the application of the soft alloy as a packing anticipated the invention of W. Newton (See post, No. 9724, p. 114), but it was held by the Court of Exchequer that though the alloys were the same, they were applied to different purposes, and as the essence of the invention lay in the application, the invention of W. Newton was not anticipated by that of Vaucher. See Law Journal (*Exchequer*) vol. 21, p. 305; Exchequer Reports, vol. 6, p. 859; London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 379; Patent Journal, vol. 9, p. 220, and vol. 11, p. 166.)

A.D. 1838, November 20.—N° 7878.

DYAR, Harrison Gray.—" Improvements in the manufacture " of zinc." Zinc ores instead of being reduced in closed vessels heated from without, are operated upon in a furnace so constructed that the ores are directly acted upon by the fire. The hot or burnt air supplied to the furnace passes through the fuel and is deprived of its oxygen, carbonic acid, or other gases or properties capable of oxydising metallic zinc, or acting injuriously to the zinc. The furnace is described with drawings.

[Printed, 6*d.* See Repertory of Arts, vol. 12 (*new series*), p. 283. London Journal (*Newton's*) vol. 14 (*conjoined series*), p. 388.]

A.D. 1838, December 1.—N° 7888.

PLAYER, JOHN.—" Improvements in furnaces and fire-places " for consuming anthracite and other fuel for generating steam, " evaporation, smelting, and heating iron and other metals." The specification and drawings describe cupola furnaces for melting metals. A calcining chamber is connected with the top of the furnace, in this chamber the coal and charge of ore are heated and are then supplied in a heated state to the furnace. Feeding chambers are also attached to refining or other furnaces for the purpose of heating the coal and charge of ore or metal before it is operated upon in the furnaces.

[Printed, 1*s*. 1*d*. See Repertory of Arts, vol. 12 (*new series*), p. 201; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 355.]

A.D. 1838, December 6.—N° 7895.

CHISHOLM, JOHN, and BELLEMOIS, MARIN HYPPOLITE.—" Improvements in treating massicott, litharge, and other com-" pounds of lead, for the purpose of obtaining therefrom silver " and certain other products." The lead and compounds of lead that are found in silver are converted into litharge. A solution is then formed of about 30lbs. of acetate or sugar of lead, or the equivalent of lead and acetic or pyroligneous acid, 63lbs. of litharge, and 400lbs. of water. The solution is heated, by preference, to about 165° F. and is then treated with currents of carbonic acid gas. The precipitate sent down is treated in the usual way, and silver is separated therefrom. Nitric acid and nitrate of lead may be used for the solution, and carbonate of lead be obtained.

[Printed, 4*d*.]

A.D. 1838, December 17.—N° 7909.

CUTLER, JOB.—" Improvements in combinations of metals ap-" plicable to the making of tubes or pipes," &c. Alloys are formed of copper, iron, nickel, zinc, and tin, severally or jointly combined. The copper should be "tough cake," but " best selected," or common " tile copper," may be used. Easily melting iron, as scrap sheet spoon iron, and "foreign zinc" should be used. The proportions of the metals will be varied according to the purposes for which they are required. The greater the proportion of iron

the harder the compound will prove, about 1lb. of nickel should be used with 10lbs. of iron.

For boiler tubes, take of

Copper 22lbs.			Or, Copper 16lbs.		
Iron	10lbs.		Iron	3lbs.	
Nickel	—	10oz.	Zinc	5lbs.	
			Nickel	—	8oz.

For gas tubes—			For small bells—		
Copper 15lbs.			Copper 12lbs.		
Iron	$3\frac{1}{2}$lbs.		Iron	3lbs.	
Zinc	$6\frac{1}{2}$lbs.		Zinc	2lbs.	
Nickel	—	8oz.	Tin	4lbs.	
			Nickel	—	10 oz.

Strong casting pots are required to bear the heat necessary to melt the melts. When the pot is red hot the nickel is put in, then the copper; when these are fused the iron is added, by preference, in small quantities with sal enixum, or borax, or other suitable fluxes—1 or $1\frac{1}{2}$ oz. of flux to about 30lbs. of mixture. When the metal is fused. and at a white heat, "add $\frac{1}{4}$ to $\frac{1}{2}$ oz. of crude " tartar, $\frac{1}{4}$ to $\frac{1}{2}$ oz. of argal," and a tea spoonful of turps mineral pounded fine; cover the metal with pounded charcoal and keep it at a white heat for 20 minutes. Then the pot may be taken off, and the metal skimmed and stirred up with about an ounce of borax, and poured into an ingot or pig, the metal when cold is broken up and remelted at an ordinary heat; borax and crude tartar should be added. Zinc and tin should be added at the second melting. Rolling machinery is also described for making pipes or tubes.

[Printed, *7d.*]

A.D. 1839, January 24.—N° 7949.

DOWLING, Thomas.—"Improvements in preparing metals for " the prevention of oxydation." Metallic surfaces are coated with zinc by the following process:—they are first roughly ground on a dry stone, then placed for about 24 hours in a bath, composed of 120 gallons of soft water, 120lbs. of soda of commerce, 30lbs. of chalk or good quicklime, and a gallon of pure olive oil. The surfaces are dried quickly in the sun or a stove; they are then rubbed by zinc surfaces, which may be attached to wheels revolv-

ing at high speeds, until the surfaces have "a smooth zincky "appearance;" they are then exposed to the action of fumes of zinc, in what is termed "a galvanic vapour furnace," and are thus coated with zinc, and should be afterwards painted or varnished.

[Printed, 1*s*. See Repertory of Arts, vol. 12 (*new series*), p. 145.]

A.D. 1839, March 6.—N° 7994.

SCHAFHAUTL, Charles.—"An improved method of smelting "copper ore." A furnace is described with drawings, having apparatus for collecting the sulphurous fumes, and obtaining sulphuric acid therefrom. The ores are mixed with alkaline bodies which have an affinity for sulphur, in order to decompose the sulphurets, or with alkaline bodies and carbonaceous matter, to decompose the carbonate of copper. The air which has passed over the heated ore in the calcining chamber is mixed with the rising fumes and steam, and is passed through the fire grate of the same furnace that heats the calcining chamber, or through another furnace before it is allowed to escape into the chimney.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 21 (*conjoint series*), p. 344. Inventors' Advocate, vol. 1, p. 68.]

A.D. 1839, April 3.—N° 8020.

PATTINSON, Hugh Lee, and LOSH, William Septimus.—"Improvements in reducing metallic ores." The lead ores are pulverised and dissolved in a closed vessel, made of wood lined with lead, in muriatic acid strength about 1·10, heated to 212° F. Sulphuretted hydrogen is given off, which is collected and applied to any suitable purpose. Chloride of lead is produced, which is dissolved in heated water, to the solution are added about 30 lbs. of unslaked lime, for every hundredweight of chloride of lead contained therein. Oxide of lead is precipitated, which is converted into "blue lead," or the lead of commerce, in the ordinary way. Lime, magnesia, barytes, or other earth may be used to cause precipitation. Sulphurets of antimony are similarly dissolved in muriatic acid, and the liquid chloride of antimony is mixed with water, or lime water, or magnesia, and a white precipitate is sent down, which is oxide of antimony, and is reduced,

and operated upon in the usual way. About 40 lbs. of lime may be used with 90 lbs. of sulphuret of antimony.

[Printed 3*d*. See Repertory of Arts, vol. 12 (*new series*), p. 352; Inventors' Advocate, vol. 1, p. 130.]

A.D. 1839, May 22.—N° 8072.

JEFFERIES, William.—"Improvements in the process of "smelting or extracting metal from copper and other ores."—The specification and drawings describe calcining furnaces, in which two or more ovens or roasting chambers are connected in one building; they have separate condensing chambers, or one common to all, with suitable flues and apparatus for collecting sulphur or sulphuric acid. The ores are mixed with coal in sufficient quantities to effect calcination. The mixture is placed in a calcining furnace, with a quantity of wood, and ignited, and allowed to burn slowly for from four to six days. The charge is then withdrawn, and lies in a wetted state for about three days, then it is mixed with lime, 2 cwt. to the ton of ore, or common soda, or other alkali, and allowed to remain wet for three or four days longer, it is then smelted in the smelting furnace.

[Printed 10*d*. See Repertory of Arts, vol. 17 (*new series*), p. 213; London Journal (*Newton's*), vol. 15 (*conjoined series*), p. 427; Inventors' Advocate, vol. 1, p. 259.]

A.D. 1839, May 22.—N° 8075.

TROUGHTON, Nicholas. — "Improvements in obtaining "copper from ores." Retorts for calcining ores are made in parts, by preference, of a series of fire tiles, each being a parallelogram. Calcining furnaces are described which are so constructed that ores are calcined in the furnace, while the waste heat is applied in preparatory chambers, to heat the ores placed therein, and so prepare them for the calcining operation. Smelting furnaces are made like reverberatory furnaces, and have a closed ashpit, into which is introduced a blast cold, or by preference heated to about 500° F. Powdered calcined copper ores are treated in leaden vessels with diluted sulphuric acid, being by preference heated with steam. From the solution thus obtained copper is precipitated by iron in the ordinary way.

[Printed, 9*d*. See Inventors' Advocate, vol. 1, p. 244.]

A.D. 1839, May 22.—N° 8076.

TROUGHTON, Nicholas.—"Improvements in the manufac-"ture of zinc." Retorts similar to those described above, see Patent N° 8075, as used for copper, may be employed for reducing zinc ores. A series of retorts are also described for smelting and distilling zinc. The retorts are set in a chamber or furnace, and heated gases and flames are made to pass under and over them. The flame and heat are urged by a blast, which may be hot or cold, and the chamber is provided with suitable flues and dampers and pipes, and distilling apparatus.

[Printed, 1s. 3d. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 81; Inventors' Advocate, vol. 1, p. 244.]

A.D. 1839, May 25.—N° 8080.

CLARK, Thomas, and CLARK, Charles.—"Glazing and "enamelling cast-iron hollow ware and other metallic substances." A vitreous compound composed of ground calcined flints and borax is applied to the surface of metals, and fused thereon so as to form a glazed surface. The enamel thus formed will withstand the action of heat and acids. The application of the process to metallic surfaces other than cast-iron was subsequently disclaimed.

[Printed, 5d. See Repertory of Arts, vol. 5 (*enlarged series*), pp. 98, 99, for Disclaimer; London Journal (*Newton's*), vol. 17 (*conjoined series*), p. 97; also vol. 21 (*conjoined series*), p. 479 for Disclaimer; Mechanics' Magazine, vol. 39, p. 144; Inventors' Advocate, vol. 1, p. 258; Dowling and Lowndes' Reports, vol. 1, p. 392; Meeson and Welsby's Reports, vol. 12, p. 219.]

A.D. 1839, June 18.—N° 8114.

WRIGHT, John.—"Improvements in mixing or alloying iron "with other metals, for the purpose of increasing its strength, "tenacity, or cohesion," &c. Bundles or coils or faggots of iron are combined with copper or other metal, not easily fusible, by inclosing them in suitable moulds, or otherwise fastening them together, and running the molten copper in between the interstices of the iron, so as to combine with it, and form a solid metallic body. Red copper of commerce may be used when melted, it is well skimmed and pulverised, glass is added, and

skimmed off to remove all scoria. Machinery is described for manufacturing the metallic compounds with links and chains. The term "alloying" contained in the title was subsequently disclaimed.

[Printed 10*d.* See London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 121; also vol. 21 (*conjoined series*), p. 478, for Disclaimer; Inventors' Advocate, vol. 2, p. 20.]

A.D. 1839, June 22.—N° 8127.

BROWN, EDWARD.—"A new principle, applied in the roasting "and refining of copper." A flux composed of equal parts of quicklime and anthracite coal, or lime and charcoal finely powdered, is thrown on the surface of melted coarse or blistered copper, while it is being roasted, or refined, or toughened. The object of the use of lime is to "remove all sulphur and other im-"purities, and render the metal highly ductile and malleable."

[Printed, 3*d.* See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 105; Inventors' Advocate, vol. 1, p. 307.]

A.D. 1839, June 22.—N° 8128.

JENNINGS, JOSEPH.—"Process for obtaining metal from "pyrites or mundic." The pyrites or mundic ores are pulverised and sifted, and a mixture is made in the following proportions:— Ores 2 oz., common salt 3 dwt., borax 1 dwt., quicklime 1 dwt., fluor spar 12 grs., charcoal 12 grs., tartar 12 grs. The mixture is melted in a pot, and the metal is run into a mould, and earthy matters and impurities are skimmed off. An assay is then made of the metal, and it is remelted with the above mixture, the proportions being increased or diminished, as will be found requisite in practice according to the quality of the ores. The process is then repeated, another assay is made, and the ore smelted with the mixture in a smelting furnace. The metal is tapped and cleansed. Tin ore is added to give toughness, iron ore and hermatite also may be added, in proportions of about 20 per cent.

[Printed, 3*d.* See Inventors' Advocate, vol. 2, p. 34.]

A.D. 1839, July 11.—N° 8149.

DUCLOS, EDWARD FRANCOIS JOSEPH.—"Improvements in "the manufacture of sulphur, sulphuric acid, and sulphate of

"soda." These relate to a mode of treating pyrites in closed retorts by a distillation process, and obtaining sulphur.

In calcining copper, zinc, or other ores containing sulphur closed retorts or chambers are used, the sulphurous acid gases are conducted into a suitable vessel, "and at the same time a "quantity of sulphuretted hydrogen," about two volumes of the latter to one of the former. Jets of steam are also introduced the bottom of the vessel being covered with water. "By this "means sulphur will be thrown down." Sulphate of protoxide of iron and common salt are pulverised and heated together in a reverberatory furnace, to produce hydrochloric acid, peroxide of iron and sulphate of soda.

[Printed, 4*d*. See Repertory of Arts, vol. 13 (*new series*), p. 90; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 103; Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 13.—N° 8151.

BELL, Thomas.—"Improvements in obtaining copper from "copper slag." Refuse copper slag is melted with coke, in the furnace described. With 10 tons of slag about half a ton of coke may be mixed, and if the slag does not run well, lime half a bushel, and peat (20 lbs.) may be used with a ton of slag.

The melted matter is run into a trough, in a recess of which the copper accumulates in a lump, while the slag is run into a vessel of water. It is there granulated, and the particles, rich in metal, will be found at the bottom, and may then be separated and reduced in the ordinary way."

[Printed, 6*d*. See Repertory of Arts, vol. 14 (*new teries*), p. 343; Inventors' Advocate, vol. 2, p. 132.]

A.D. 1839, July 13.—No. 8152.

YATES, James.—"Certain improvements in the construction of "cupord furnaces for melting metals."

[No Specification enrolled.]

A.D. 1839, August 8.—N° 8189.

BURR, Thomas.—"Improvements in rolling lead and other "soft metals." Rollers for rolling soft metals are heated, they

are made hollow, and steam or hot water or hot air is introduced into them by any suitable means.

[Printed, 3*d*. See Repertory of Arts, vol. 31 (*new series*), p. 152; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 228; Inventors' Advocate, vol. 2, p. 146.]

A.D. 1839, October 3.—N° 8232.

CUTLER, Job.—" Certain improved combinations of metals to " be used for various purposes." Various alloys composed of copper ("best selected or tough cake"), zinc ("foreign"), lead ("blue lead of commerce"), iron ("scrap or malleable cast-iron"), and antimony are described. I. By combining 40 parts of copper with 20 of zinc and 20 of lead, an alloy is produced, which may be used like brass, it will roll hot. II. A more costly alloy is formed by mixing 40 parts copper, 20 zinc, and 5 lead. III. A hard alloy is formed by mixing 40 parts copper, 50 zinc, and 10 to 20 parts of lead. The lead must be "killed." This is done by taking say, 56 lbs. of lead, and melting it in a closed furnace, having a pipe to carry off fumes; when melted 4 or 6 oz. of arsenic are added, and resin and sawdust are thrown on the surface, and after about half an hour are well stirred in the lead; if it have not lost its ductility about 1 lb. of common salt may be mixed therewith. The killed lead is added to the copper; when the mixture is melted from 4 to 6 lbs. of calamine are added to about 100 lbs. of the mixture; when all are well fused the zinc is added. The "pot is stopped down" with coke dust, and after about 10 minutes about "2 oz. of sal " enixum of borax" are added, for 30 lbs. of mixture. The mixture is kept at a bright red heat for 5 minutes, then run into moulds. When equal parts of copper, zinc, and lead are to be combined the lead is first melted, and the zinc added. The mixture is run into ingots or sheets, and broken up. The copper is then fused with calamine, in the proportion of 6 or 10 per cent of the combination, and the zinc and lead are added thereto and well stirred. When the alloy is made into sheets it is rolled at a bright red heat. IV. 40 parts of copper, 40 of zinc, 14 of lead, and 6 parts of iron (by preference, tin plate scrap,) form a good alloy. Scrap sheet iron may be used or cast malleable iron, and an ounce of tin should then be added for every pound of iron. Take of copper 38 lbs., scrap tin 12 lbs., melt them in a casting pot, add 12 oz. of metallic antimony, and fluxes, as pounded glass,

sal enixum, or borax, and ½ oz. "of turpeth mineral." When the mixture is quite fluid add an ounce of sal ammoniac, close the pot, keep it at a white heat for 10 minutes, stir it, and run it into "sows." Zinc may be added to the first mixture, but it is better to remelt it and add it afterwards. Equal quantities of the zinc and mixture will make brass.

For nails and engine and mill brasses, take 14 lbs. of copper, 2 lbs. 8 oz. of Cumberland or malleable cast iron, 2 lbs. 8 oz. of zinc, and 1½ oz. of tin, and 3 oz. of metallic antimony. Melt first the copper and iron, and add fluxes; then melt the compound with the zinc and tin; ½ oz. to 1 oz. of antimony should be used with 1 lb. of iron, or nickel may be used in lieu thereof. If zinc and lead be alloyed with copper and iron, the two latter are first combined, and the zinc and lead are added as in process IV.

[Printed, 4*d.* See Inventors' Advocate, vol. 2, p. 227.]

A.D. 1839, November 16.—N° 8271.

WIESMANN, William.—"Improvements in the manufacture "of alum." Clay is calcined and ground and dissolved in sulphuric acid. The solution is tested, and a quantity of prussiate of potash equal to the weight of iron contained in the solution is added thereto, iron is precipitated thereby and the liquor remaining is drawn off, filtered, and crystallized.

[Printed, 3*d.* See Repertory of Arts, vol. 14, (*new series,*) p. 53; London Journal (*Newton's*), vol. 16 (*conjoined series*), p. 365; Inventors' Advocate, vol. 2, p. 339.]

A.D. 1839, December 9.—N° 8305.

RICHARDSON, Thomas.—"A preparation of sulphate of lead," &c. About a ton of protoxide of lead or "flake litharge" is put in a leaden or other suitable vessel. Acetic acid of sp. gr. about 1·046 is added, 1 part to about 56 of the lead; the mixture is stirred and an acetate of lead is formed. Sulphuric acid of sp. gr. about 1·5975 is then added in sufficient quantities, about 1lb. at a time, to convert all the lead into a sulphate; from 20 to 40 parts of acid to about 112 parts of the protoxide will be required.

The sulphate of lead is washed, and dried, and ground, and may be used as a substitute for carbonate of lead.

[Printed, 6*d.* See Repertory of Arts, vol. 14 (*new series*), p. 92; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 170; Inventors' Advocate, vol. 2, p. 387.]

A.D. 1840, January 28.—N° 8366.

WHITEHOUSE, JOHN.—" Improvements in preparing and " rolling iron and other metals or metallic alloys for the manu- " facture of certain articles of commerce." Rolling apparatus is described with drawings. The rolls have portions of their surfaces cut away, so that when strips or sheets of metal or alloy are passed through them, "blanks" of a shape suitable for the manufacture of various articles are made.

[Printed, 6d. See Inventors' Advocate, vol. 3, p. 83.]

A.D. 1840, January 5.—N° 8374.

COOKSON, WILLIAM ISAAC.—" Certain improved processes or " operations for obtaining copper and other metals from metallic " ores." Five processes are described. 1st. " Sulphureous ores," containing copper, sulphur, iron, and silver in small quantities, are reduced to a protosulphuret by distilling sulphur therefrom; the iron is dissolved by muriatic or sulphuric acid, and sulphuretted hydrogen is obtained, and muriate or sulphate of iron. The sulphuret of copper and silver remain undisso and may be operated upon as usual.

2d. Sulphureous ores are roasted at a bright red heat, and are exposed to the air until the sulphurets of iron and copper are converted into oxides; these are treated with muriatic acid, and muriate of copper is produced from which metallic copper is obtained.

3d. The roasting of the ores is carried on while they are exposed to the air, until the greater part of the sulphuret of iron contained therein is converted into an oxide, then, by leaving the ores exposed to the atmosphere, the copper which remained a sulphuret is "converted into sulphate;" this is dissolved in acids.

4th. The ores are roasted until the sulphuret of iron is converted into a protosulphuret, they are then "fluxed with carbonaceous " matter," and dissolved in sulphuric or muriatic acid.

5th. Oxide ores containing copper in combination with oxygen are dissolved in muriatic or sulphuric acid, and from the muriate of copper, metallic copper, and from the sulphate, copper and

sulphurous acid are obtained. Apparatus is described which is specially intended for carrying on the various processes.

[Printed, 5d. See Repertory of Arts, vol. 14 (*new series*), p. 222, also vol. 15 (*new series*), p. 90; Inventors' Advocate, vol. 3, p. 114.]

A.D. 1840, February 29.—N° 8403.

NEILSON, JAMES BEAUMONT.—"Certain improved methods "of coating iron," &c. "Copper, or copper alloyed with zinc or "tin or both," may be deposited as a coating on iron, by taking the copper or alloy in a finely divided state, as powder, or "combined in its various salts either natural or artificial." The copper or alloy powder is mixed with borax or other flux, and is spread evenly over the interior surface of a mould in which any article is to be cast, the molten iron is run into the mould and will be coated as required. The surfaces of malleable iron are coated by applying the powder to them and fusing it in contact therewith in a suitable furnace.

[Printed, 3d. See Inventors' Advocate, vol. 3, p. 147.]

A.D. 1840, March 3.—N° 8407.

SHORE, JOSEPH.—"Improvements in preserving and covering "certain metals and alloys of metals." The improvements consist in the employment of the galvanic battery and solutions of metallic salts for "treating manufactured articles of common "metals," as iron, tin, lead, copper, and their alloys, and giving them by the well-known electro process a permanent covering of copper or nickel.

[Printed, 3d. See Repertory of Arts, vol. 14 (*new series*), p. 353; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 82; Inventors' Advocate, vol. 3, p. 162.]

A.D. 1840, March 25.—N° 8447.

ELKINGTON, GEORGE RICHARDS, and ELKINGTON, HENRY. —"Improvements in coating, covering, or plating certain metals." Metallic articles may be plated with silver by depositing a coating of silver thereon by the old dipping processes, and afterwards fusing the same thereon.

Or the galvanic processes are employed for coating metallic surfaces with silver, or gold, or copper, or other metals, by the use of solutions of oxides, or chlorides, or sulphates, or other suitable salts of the metals or the metals in fine division.

The surfaces of iron are prepared by dipping them in diluted sulphuric acid, being first connected by wire with a piece of zinc.

[Printed, 5*d*. See Repertory of Arts, vol. 16 (*new series*), p. 239; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 83; Mechanics' Magazine, vol. 33, p. 397; Inventors' Advocate, vol. 3, p. 228.]

A.D. 1840, April 23.—N° 8483.

SPARKE, JONATHAN.—"Certain improved processes or opera- "tions for smelting lead ores."

[No Specification enrolled.]

A.D. 1840, May 2.—N° 8490.

WALL, ARTHUR.—"A new composition for the prevention of "corrosion in metals and for other purposes." Steel or wrought iron filings about 112lbs. are heated and placed in diluted muriatic acid, and oxidised and digested; the oxides are placed in a pan and all moisture evaporated by heat. The residuum is mixed with quicksilver, about 16lbs., and dissolved in nitric acid and evaporated. The residuum is pounded in a mortar, and after being washed and again heated is mixed with minium, and suitable oils, and used for coating metallic surfaces.

[Printed, 11*d*. See Repertory of Arts, vol. 16 (*new series*), p. 134; London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 309; Mechanics' Magazine, vol. 33, p. 478; Inventors' Advocate, vol. 3, p. 323; Engineers and Architects' Journal, vol. 3, p. 429.]

A.D. 1840, May 28.—N° 8518.

GUEST, Sir JOSIAH JOHN, and EVANS, THOMAS.—"Improve- "ments in the manufacture of iron and other metals." Steam is introduced into the furnaces employed in refining metals, and is directed upon the surface of the various melted metals operated upon. It may be used for iron while being puddled or refined, and for copper and its alloys, and tin, and tin and iron, while they are being refined.

[Printed, 9*d*. See Repertory of Arts, vol. 16 (*new series*), p. 281; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 447; Mechanics' Magazine, vol. 33, p. 381; Inventors' Advocate, vol. 3, p. 230; Engineers and Architects' Journal, vol. 3, p. 396.]

A.D. 1840, July 1.—N° 8557.

JEFFERIES, William.—" Improvements in obtaining copper, " spelter and other metals from ores." Copper ores, raw or calcined, are charged in a melting furnace, and when they are melted a suitable quantity of carbon, as anthracite coal or charcoal, and alkali, as common soda, is stirred into the mass until it becomes dry and friable, the metal is then drawn off and another charge introduced, and the process repeated; the metal so obtained is afterwards worked up in the ordinary way. Zinc ores are reduced in a large closed furnace, in which several tons may be operated upon at once instead of being reduced in the usual retorts. The furnace is provided with pipes and condensing apparatus. The ores are mixed with 5 per cent. of bituminous coal.

[Printed, 8*d*. See Repertory of Arts, vol. 16 (*new series*), p. 29; London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 244; Mechanics' Magazine, vol. 34, p. 92; Inventors' Advocate, vol. 4, p. 50.]

A.D. 1840, July 27.—N° 8575.

TODD, Francis.—" Improvements in obtaining silver from ores " and the matters containing it." The ores and other matters containing silver are melted, and run in a fluid state into a bath of melted lead; the silver having a great affinity for the lead combines therewith, and the compound is treated by the usual means employed for obtaining silver.

[Printed, 3*d*. See Repertory of Arts, vol. 15 (*new series*), p. 308; Mechanics' Magazine, vol. 34, p. 139; Inventors' Advocate, vol. 4, p. 83.]

A.D. 1840, August 15.—N° 8604.

FONTAINEMOREAU, Pierre Armand le Comte de.—" Im- " provements in covering and coating metals and alloys of metals." —(*A communication.*) The specification describes modes of covering or coating inferior metals and their alloys with gold, silver, and platinum. The articles to be coated are first cleansed by steeping them in acidulated mixtures and scouring them. Modes of preparing gold solutions and of composing five different baths are described; and the use of " barytes, strontites, lithine, lime, " magnesia, and zinc, and their salts," therein is claimed. Various solutions of silver are described and suitable baths, for which the use of " chlorines of barium, barytes of sodium, of strontium,

" strontites of lime, of magnesia, and of zinc" is claimed. Also solutions of platinium and suitable baths are described, for which the use of "double chlorines of platinum, and of barium barytes, " and of strontium, strontites of magnesia, of lime, of ammonia, " and of zinc is claimed.

[Printed 4*d*. See Mechanics' Magazine, vol. 34, p. 175; Inventors' Advocate, vol. 4, p. 132.]

A.D. 1840, September 17.—N° 8634.

RICHARDSON, Walter, and BRAITHWAITE, George Mott.—"Improvements in tinning metals." A tinning alloy is formed by fusing in a crucible 10 oz. of best nickel, 7 oz. of sheet iron, and 10 lbs. of tin. To form a protecting flux, 1 oz. of borax and 3 oz. of pounded glass are melted with the mixture. The alloy is applied to the surfaces of iron in the ordinary way.

[Printed, 3*d*. See Repertory of Arts, vol. 16 (*new series*), p. 111; Mechanics' Magazine, vol. 34, p. 251; Inventors' Advocate, vol. 4, p. 197.]

A.D. 1840, November 3.—N° 8677.

EMMERSON, Richard Farger.—"Improvements in applying " a coating to the surfaces of iron pipes and tubes." The surfaces of iron are coated with tin or alloy of tin; they are first pickled and scoured, and then immersed in a bath composed of about 3 oz. of zinc or spelter dissolved in about a pint of muriatic acid. The surfaces are then dusted with powdered rosin and dipped in a bath of melted tin or alloy. If the coating is not perfect, the article is again dipped in the acid solution, and subsequently in the bath.

[Printed 3*d*. See Repertory of Arts, vol. 16 (*new series*), p. 173; Inventors' Advocate, vol. 4, p. 308.]

A.D. 1840, November 17.—N° 8703.

WILLIAMS, Charles Wye.—"Improvements in the con" struction of furnaces and boilers." In order to "transmit " heat with increased rapidity and in large quantities" through the plates of boilers, stills, pans, or evaporators metallic conductors or short rods are inserted in the plates; one end of each rod projects into the fire or flames, the other projects into boiler

or pan. The grates of furnaces are made with moveable bars to admit of the fuel being fed in as required and to prevent the bars from being choked.

[Printed 10*d*. See London Journal (*Newton's*), vol. 18 (*conjoined series*), p. 361, Mechanics' Magazine, vol. 34, p. 430, and vol. 35, p. 289; Inventors' Advocate, vol. 4, p. 341; Engineers and Architects' Journal, vol. 4, p. 234.]

A.D. 1841, January, 14.—N° 8793.

JONES, Alexander.—" Improvements in the manufacture of " copper tubes and vessels." The action of voltaic electricity is applied to coating moulds made of the required form with copper or other metals. The mould, if formed of plastic materials, is first covered with a metallic surface in the usual way, and copper is deposited thereon in a tubular or other desired form.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 19 (*conjoined series*), p. 106; Mechanics' Magazine, vol. 34, p. 399; Inventors' Advocate, vol. 4, p. 324.]

A.D. 1841, January 30.—N° 8820.

MANBY, John.—" Improvements in the construction of pud- " dling, balling, and other sorts of reverberatory furnaces," &c. The specification and drawings describe reverberatory furnaces having a grate or fire-place surrounding the working hearth or bottom, except at the places where it is interrupted by the working door and the canal leading to the chimney. The metals and ores are thereby subjected on all sides to the action of the heat. Anthracite coal may be advantageously used. The furnaces are adapted for working iron and also copper and other fine ores.

[Printed, 9*d*. See Mechanics' Magazine, vol. 35, p. 144; Inventors' Advocate, vol. 5, p. 84.]

A.D. 1841, February 8.—N° 8833.

GRIFFITHS, THOMAS.—" Improvements in such dish covers " as are made with iron covered with tin." Rolling and stamping machines are described for giving hollow shapes to sheets of metal. The hollow shape is given by gradual and repeated processes, care being taken properly to anneal the metal after each operation. When the annealing processes are finished, the article is tinned, and a machine is described for planishing and consolidating the tinned surface.

[Printed, 1*s*. 6*d*. See Mechanics' Magazine, vol. 35, p. 189; Inventors' Advocate, vol. 5, p. 100.]

A.D. 1841, February 8.—N° 8838.

GREEN, Charles.—" Improvements in the manufacture of " brass and copper tubes." The specification and drawings describe improvements on the former Patent, dated June 27, 1839. See No. 7707, p. 81.

They consist in forming a short brass or copper tube with an internal circular rim to form a stop to the mandrel, which is inserted when the tube is drawn. Also an improved apparatus for holding and inserting the mandrel, and for making calico-printers' rollers.

[Printed, 2s. 9d. See Mechanics' Magazine, vol. 35, p. 190; Inventors' Advocate, vol. 5, p. 100.]

A.D. 1841, March 22.—N° 8890.

MERRY, Anthony Theophilus.—" An improved process or " processes for obtaining zinc and lead from their respective ores, " and for the calcination of other metallic bodies." The improved process in stated to consist in "the application of the heat arising " from the carbonising, or converting pit coal into coke, to certain " furnaces and subliming vessels" for calcining, roasting, and smelting zinc, lead, and other ores. A suitable furnace and subliming pots are described in connexion with a coke oven. The ores of zinc are washed, pulverised, and calcined, and impure oxides are obtained, which are mixed with one quarter by weight of pulverised charcoal or carbonaceous matter, and are charged in the subliming pots, and worked up in the usual way.

[Printed, 7d. See London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 269; Mechanics' Magazine, vol. 35, p. 303; Inventors' Advocate, vol. 5, p. 212.]

A.D. 1841, March 29.—N° 8905.

PARKES, Alexander.—" Improvements in the production of " works of art in metal by electric deposition." Silver or gold is deposited on moulds formed in suitable shapes as works of art by the agency of electricity, the moulds being subsequently removed.

The prior Specification of G. R. and H. Elkington, see *ante*, N° 8447, p. 96, is referred to as describing processes of permanently gilding or silvering surfaces. A solution of gold is formed

by dissolving an ounce of gold in aqua regia, evaporating to dryness, and adding two gallons of water, and 16 oz. of prussiate of potash. A solution of silver is obtained by dissolving an ounce of silver in nitric acid, and precipitating it by "lime water as oxide "of silver." The oxide is washed; two gallons of water are added, and one pound of prussiate of potash. The moulds may be formed entire or in parts, of plastic materials, wax or clay, or coated with a solution of caoutchouc, or other non-conducting substance. Or fusible metals or alloys may be used for formed the moulds, as,—

1. Bismuth, 14 parts—mercury, 16 parts—lead, 32 parts.
2. Bismuth, 4 parts—lead, 4 parts—tin, 1 part—mercury, 1 part.
3. Bismuth, 1 part —lead, 2 parts.
4. Bismuth, 3 parts—lead, 6 parts—antimony, 1 part.

A baser metal may be deposited inside hollow articles made of the precious metals to strengthen the latter.

[Printed, 7*d*. See Repertory of Arts, vol. 17 (*enlarged series*), p. 199; London Journal (*Newton's*), vol. 20 (*conjoined series*), p. 171; Mechanics' Magazine, vol. 35, p. 315; Inventors' Advocate, vol. 5, p. 227.]

A.D. 1841, June 26.—N° 9008.

POOLE, Moses.—"Improvements in producing and applying "heat."—(*A communication.*) The specification and drawings describe furnaces and apparatus in which carbonic oxide gas is used instead of the ordinary fuel.

The gas may be obtained from blast furnaces. The furnaces may be employed in manufacturing or working metals or for various other purposes.

[Printed 1*s*. 4*d*. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 80; Mechanics' Magazine, vol. 36, p. 46.]

A.D. 1841, July 31.—N° 9033.

WELCH, John White.—"An improved reverberatory furnace "to be used in the smelting of copper ore or other ores which are "or may be smelted in reverberatory furnaces." The reverberatory furnace for smelting metals is so constructed that the flame and products of combustion "are divided into two separate cur- "rents which pass away laterally from the body of the furnace in "opposite directions," and go by two distinct flues to the chim-

neys. In each of these flues or passages part of the ore or regulus may be placed to be acted upon by the heat. A common chimney or two separate chimneys may be used.

[Printed, 7*d*. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 17; Mechanics' Magazine, vol. 36, p. 93.]

A.D. 1841, August 11.—N° 9045.

BROWN, SAMUEL.—" Improvements in the manufacture of " metallic casks or vessels, and in tinning or zincing metal for " such and other purposes." The specification and drawings describe apparatus for soldering the heads of metallic casks, and a furnace " for keeping a quantity of tin or alloy in a melted state." The end of the cask is dipped in the bath to make a tight joint. Plates are tinned by dipping them in the bath, and laying them afterwards upon a heated surface or plate. The superfluous metal is removed or wiped off by tow, the " hot plate keeping the coating " metal melted on the surfaces to allow of that operation."

[Printed 1*s*. 6*d*. See Mechanics' Magazine, vol. 36, p. 143.]

A.D. 1841, August 27.—N° 9055.

MOREWOOD, EDMUND.—" An improved mode of preserving " iron and other metals from oxidation or rust." The metallic surfaces are first coated with tin or its alloys, in the usual way, then dipped in a bath of melted zinc, and coated with that metal.

[Printed, 4*d*. See Repertory of Arts, vol. 18 (*new series*), p. 170; London Journal (*Newton's*), vol 24 (*conjoined series*), p. 117; Mechanics' Magazine, vol. 36, p. 238.]

A.D. 1841, September 8.—N° 9077.

BARRATT, OGLETHORPE WAKELIN.—" Improvements in the " precipitation or deposition of metals." Surfaces of copper or its alloys are cleansed by suspending them in an acid solution, in connexion with the negative pole of a battery, and removing the scale or oxide.

Metallic surfaces are coated with zinc by the electro process, and suspending them in acid, or saline solutions of zinc.

Solutions of copper are formed by combining cyanuret of potassium 8 lbs., cyanuret of copper 2 lbs., water 3 gallons, boiled in a copper vessel.

Brass coatings are obtained by depositing copper, then zinc, and submitting the doubly-coated articles to heat in a muffle.

A solution of platinum or palladium is obtained by boiling the metals in water holding in solution muriate of soda 12 parts, alum 2 parts, cream of tartar 1 part.

Copper is precipitated from waters holding it in solution by introducing iron.

Solutions of the precious metals are obtained by dissolving their sulphurets in hydrate of potash, and boiling them.

Alloys of metals may be deposited by dissolving the alloys, or the sulphurets of the metals taken in the requisite proportions, in cyanuret of potassium, and proceeding in the manner described, "when using a galvanic or other battery, in respect to gold, "silver, or platinum, using an alloyed anode agreeing with the "proportions contained in the solution."

[Printed, 4*d*. See Repertory of Arts, vol 17 (*new series*), p. 367. London Journal (*Newton's*) vol 20 (*conjoined series*), p. 438. Mechanics' Magazine, vol. 36, p. 476.]

A.D. 1841, November 2.—N° 9135.

BRUNTON, William.—"An improved method or means of "dressing ores and separating metals or minerals from other "substances." The specification and drawings, which are numerous, describe apparatus for sifting, washing, and separating metallic particles in ores. The ores or metallic particles are first separated into classes by means of sieves. The particles are then precipitated in a tank or vessel, provided with apparatus so constructed as to catch and remove all the particles which fall in a given space of time, as in the first, ten seconds, then those that fall in the second ten seconds, &c. The particles of the greatest specific gravity will fall first and be removed, and the others will be after that collected according to their various specific gavities, and the times taken by them in falling.

[Printed, 1*s*. 9*d*.]

A.D. 1841, November 4.—N° 9139.

LEJEUNE, Jules.—"A means of condensing and collecting the "sulphurous and metallic vapours which are evolved in the "treatment by heat of all kinds of ores." The specification and drawings, which are very numerous, describe furnaces and other

apparatus for operating upon copper, lead, zinc, and other ores containing sulphur, arsenic, or other volatile matters. The principles on which the processes are conducted (by the aid of steam) are stated to be six:—" 1. The passage under water of vapour, " separated or mixed with the smoke of fireplaces. 2. The use of " a vapour spout as a means of suction. 3. The action of " currents one upon the other, and the surrounding air. 4. A close furnace for the operations of roasting, boiling, sublimating, gassification, &c. 5. The decomposition of sulphurous acid by sulphuretted hydrogen. 6. A furnace with winding chimneys alternately used shut and open.

[Printed, 2*s*. 3*d*.]

A.D. 1841, November 11.—N° 9154.

DUCLOS, Edward Joseph François.—" Improvements in " the manufacture of copper." Sulphurous ores of copper or sulphurets are ground to about the size of one quarter or one third of an inch, are mixed with about one eighth by weight of quicklime, and are then calcined in large kilns. These are made with suitable flues, whereby the fumes and gases are collected, and may be applied to produce sulphur and sulphuric acid. The calcined ores are then reduced in a blast furnace, and made like an ordinary blast furnace, with the addition of condensing chambers and feeding apparatus. The mixture of metallic copper and cast iron obtained is fused in an ordinary cupola, so as to insure the liquidation of both metals. Black copper is separated by the difference of gravity, and then is refined in the usual way.

[Printed, 9*d*. See Repertory of Arts, vol. 18 (*new series*), p. 15; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 182; Mechanics' Magazine, vol. 36, p. 476.]

A.D. 1841, December 9.—N° 9167.

TALBOT, William Henry Fox.—" Improvements in coating " or covering metals with other metals, and in coloring metallic surfaces." Gallic acid is added to solutions of gold, silver, platina, or other metals, to facilitate the deposition of those metals on other metallic surfaces. Other analogous vegetable substances may be used.

A solution of silver is obtained by dissolving freshly precipitated

chloride of silver in hyposulphite of soda, or other liquid hyposulphite, and may be used in the electro-galvanic processes.

Surfaces of copper, or its alloys, may be gilded in pattern, and then washed with a solution of chloride of platina, which gives to the ungilded parts a dead black appearance.

Polished surfaces of copper are coloured by exposing them, or parts of them, "to the vapour of sulphuretted hydrogen, or any of " the liquid hydrosulphurets, or to the vapours of sulphur, " iodine, bromine, or chlorine, or dipping the metal into liquids " containing them." The use of the hydrosulphurets is preferred.

Copper surfaces may be made nearly white, to form metallic specula or mirrors. "An electrotype cast in copper is taken from " a polished plane or spherical surface;" it has "nearly the same " degree of polish as the original," and is whitened "by exposing " it to the action of vapours, as above described."

[Printed, 3*d*. See Repertory of Arts, vol. 1 (*enlarged series*), p. 47; London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 357; Mechanics' Magazine, vol. 36, p. 496; Engineers and Architects' Journal, vol. 5, p. 358.]

A.D. 1841, December 16.—N° 9185.

NORTON, John.—"Improvements in sheathing ships and other " vessels." The bottom of the vessel is coated with varnish or resin, and a coating of copper is to be deposited thereon, by placing the ship in a suitable solution of copper, and employing the ordinary electro-galvanic process.

[Printed, 3*d*.]

A.D. 1841, December 16.—N° 9187.

CHURCH, William, and HARLOW, Jonathan.—" Improve- " ments in the mode of manufacturing metallic tubes, and in the " mode of joining them or other tubes or pieces for various " useful purposes." The specification and drawings describe apparatus for forming tubes in a taper shape, specially suitable for the manufacture of metallic bedsteads. The joints are formed by bringing the ends of the tubes together, and casting the joint upon them.

[Printed.

A.D. 1842, January 13.—N° 9218.

JONS, JAMES.—" Improvements in smelting copper ores." The ores are smelted in a cupola furnace, with a powerful blast. The furnace has metal plates on the outside of the masonry of the hearth, with holes at different elevations, for tapping off iron scoria or slag, which is obtained in a vitreous condition, the copper being allowed to " separate or subside therefrom."

The furnace above the plates is surrounded with a case, or compartments, or pipes of iron, or other metal, which may be filled with water, and form " refrigerators," and by keeping the furnace cool will prevent the necessity of frequent repairs. A flue is connected with a chamber or tower, where the sublimed products are condensed. The metallic deposits formed by incrustation on the cupola are removed by taking out the plates. The mass is crushed and treated with acids, or otherwise operated upon as regulus of copper, or the substance to be operated upon is placed in a reverberatory furnace, and subjected to great heat. It is withdrawn in masses of convenient size, and subjected to strong pressure, which " retains the iron," and causes " the copper to exude."

[Printed, 9*d*. See London Journal (*Newton's*), vol. 21 (*conjoined series*), p. 327.]

A.D. 1842, May 19.—N° 9351.

BRUNTON, WILLIAM.—" An improved method or means of " dressing ores, and separating metals or minerals from other " substances." The ores are crushed small, and separated into classes by sifting them through sieves; they are then precipitated in a vessel of water, provided with revolving apparatus, so constructed that the particles which fall with different speeds, according to their greater or lese specific gravities, are collected and separated accordingly.

Suitable collecting boxes are described, and apparatus for discharging the classified particles into separate compartments by the aid of water.

[Printed, 1*s*. 7*d*. See Record of Patent Inventions, vol. 1, p. 136.]

A.D. 1842, June 1.—N° 9374.

LEESON, HENRY BEAUMONT.—" Improvements in the art of " depositing and manufacturing metals and metal articles, by " electro-galvanic agency, and in the apparatus connected there-

"with." The specification is a long one, and describes, with drawings, batteries, and other apparatus, also a great variety of solutions of various metals, and the various salts and acids that may be employed.

The galvanic battery is used for "cleaning the zinc and copper "plates," and for "depositing mercury on the zinc plates.

Articles are silvered by using a strong solution of cyanide of silver and potassium. Motion should be given to articles suspended in the solution by means of a jack or other mechanism. The deposit is thereby rendered even, although the action of the battery be strong. Parabolic reflectors and specula are formed by depositing suitable metals or alloys on the surface of a mould, and forming a back thereto of deposited copper. Alloys of various metals are deposited on metallic surfaces by using suitable compound solutions and suitably arranged batteries.

[Printed, 2s. 0d. See London Journal (*Newton's*) vol. 22 (*conjoined series*), p. 292; Mechanics' Magazine, vol. 38, p. 59; Record of Patent Inventions, vol. 1, p. 353.]

A.D. 1842, June 4th.—N° 9379.

TUCK, EDMUND.—"Improvements in the covering or plating "with silver various metals and metallic alloys." The invention consists in the use of sesquicarbonate or bicarbonate of ammonia with salts of silver in silvering metals and their alloys (which are usually copper, and German silver) "by the action of electricity," German silver is composed of copper, nickel, and zinc, and varies in quality. For silvering or plating common German silver, take a mixture of a solution of 70 parts by weight of bicarbonate of ammonia, and with 156 parts by weight of sulphate of silver. For copper, or good German silver, instead of the sulphate, 144 parts by weight of cyanide of silver may be used. The strength of the solution must depend on that of the galvanic battery; for bad German silver, ½ oz. of sulphate of silver, 107 grains of bicarbonate of ammonia may be mixed with a pint of water. Simple modes of preparing the carbonates of ammonia, and the salts of silver, and of constructing and using the battery, are described.

[Printed, 4d. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 458; See Record of Patent Inventions, vol. 1, p. 373.]

A.D. 1842, July 29.—N° 9429.

BELL, THOMAS. — "Improvements in the manufacture of "co ores are broken small, and introduced

into "an air or melting furnace," when it is at a white heat. If the ores contain much sulphur or arsenic, to every 20 parts of ore 2 or 3 parts of lime, limestone, or other calcareous substances are added. When the charge is melted it is run out in a vitrefied mass into moulds. Or the upper portion is "tapped off" first, and then the lower, which is richer in metal. A double air or melting furnace is described which is worked with one fire.

The vitrified mass from the melting furnace is broken up, and melted in a cupola, with a hot or cold blast, and is run off as it melts into a vessel of water and granulated. The granulated particles are washed and separated by "jigging" apparatus, and worked up in the usual way.

[Printed, 7*d*. See Repertory of Arts (*enlarged series*), p. 129; Mechanics' Magazine, vol. 38, p. 144; Record of Patent Inventions, vol. 1, p. 492.]

A.D. 1842, August 1.—N° 9431.

WOOLRICH, John Stephen.—"Improvements in coating " with metal the surface of articles formed of metal or metallic " alloys." The specification and drawings describe magnetic apparatus for coating metallic surfaces, and modes of preparing the solutions required.

To form the solution take 28 lbs. of best pearlash of commerce, boil with 30 lbs. of water in an iron vessel; when dissolved let the mixture cool; filter, and add 14 lbs. of distilled water; saturate with sulphurous acid gas by means of currents passed through the solution, and again filter.

To make gilding liquor. — Dissolve of gold 4 oz. troy in a mixture of 11 fluid ounces of nitric acid (sp. gr. 1·45), and 13 oz. of muriatic acid (sp. gr. 1·15), and 12 oz. of distilled wate. Evaporate and crystallize. Dissolve the crystals in 1 lb. of water, and precipitate gold by pure magnesia. Wash the precipitate first with water acidulated by nitric acid, then with pure water. Dissolve the precipitate in the solvent sulphite of potash, adding one fifth that the solvent may be in excess. Let the solution stand for 24 hours, then filter it ready for use.

To make silvering liquor.—Dissolve 12 oz. (av.) of crystallized nitrate of silver in 3 lbs. of distilled water; add to the solution the prepared solvent in small quantities as long as a whitish precipitate is produced, which first wash in water, then dissolve in the solvent, adding one sixth, that the solvent may be in excess. Let the solution stand for 24 hours, then filter it.

To make coppering liquor.—Dissolve 7 lbs. of crystallized sulphate of copper in 30 lbs. of distilled water. Add a solution of carbonate of potassa in water until precipitation ceases. Wash the precipitate, and then dissolve it in the solvent, adding one third that the solvent may be in excess. Let solution stand for 24 hours, then filter it.

[Printed, 10*d.* See Repertory of Arts, vol. 1 (*enlarged series*), p. 210; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 460; Mechanics' Magazine, vol. 38, p. 145.]

A.D. 1842, August 10.—N° 9441.

STURGES, Richard Ford.—"A certain improvement in the "manufacture of Britannia metal and plated wares."—A "frosted, grassed, matted, or dead" surface is given to articles made of Britannia metal by chasing or engraving their surfaces, or by means of dies or rollers which have sunken or engraved upon them suitable dots or lines. The surfaces are finished by washing them with soap and water, or water tinctured with acids or alkalis.

[Printed, 3*d.*]

A.D. 1842, October 20.—N° 9496.

LONGMAID, William.—"Improvements in treating ores and "other minerals, and in obtaining various products therefrom," &c. The ores which contain much sulphur are exposed to heat in combination with an excess of common salt, as about 60 of salt to 40 of sulphur, which takes out the sulphur, and is itself converted into sulphate of soda. A reverberatory furnace is described, in which steam may be injected into the charge. The furnace is provided with four beds, each back bed being on a higher level than the front one. The charges are raked as they are heated from the higher to the lower beds. The mass first becomes semi-pasty, then dries up and becomes granular. It may then be withdrawn. The sulphate ash will contain sulphate of soda, chloride of sodium, oxides of iron, soluble salts of copper, oxide of tin, &c., according to the ores operated upon. From these substances the metals are obtained by dissolving and by precipitation in the usual way.

[Printed, 7*d.* See Repertory of Arts, vol. 2 (*enlarged series*), p. 31; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 274; Mechanics' Magazine, vol [illegible]]

A.D. 1842, October 27.—N° 9501.

MULLINS, John.—" Improvements in making oxides of metals, " in separating silver and other metals from their compounds " with other metals," &c. These consist, 1st, in causing oxides to form on the surface of or in melted metals " heated to the tempe- " rature of their respective points of oxydation," and forcing gas or air through the molten mass by pipes connected with blowing or exhaust apparatus. The oxides are skimmed from the surface, and in the case of lead the remaining metal is surcharged with silver, and is then operated upon more easily to effect a separation of the different metals.

2d. White lead is manufactured by exposing oxide of lead obtained, as above described, to the vapour of vinegar and carbonic acid gas.

3d. Solutions of acetate of lead or other salt of lead made from the oxides are similarly exposed to the action of carbonic acid gas.

5th. Common salt may be used as a deoxydising agent in reducing the oxides of the metals.

6th. Iron particles may be separated from other metals by means of an arrangement of vibrating trays and magnets, as described.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 22 (*conjoined series*) p. 352; Mechanics' Magazine, vol. 38, p. 488; Engineers and Architects' Journal, vol. 6, p. 303.]

A.D. 1842, November 25.—N° 9528.

TALBOT, William Henry Fox.—" Improvements in coating " or covering metals with other metals."—Metallic surfaces are prepared for being gilt by giving them a very thin coating of silver, which may be done by dipping them in a weak solution of silver in hyposulphate of soda; or the metallic surface is first cleaned, then suitably connected to an electrode of a battery, and made to give off hydrogen gas. It is then dipped in proper solution of gold or silver, and receives a coating. If it is not sufficiently thick the surface is again made to give off hydrogen gas, and again dipped, and the coating is thickened as required.

A gilding solution is formed by mixing a solution of chloride of gold with a solution of a baser metal, as nitrate of lead, or, by preference, hydriodate of zinc.

For gilding brass a solution of boracic acid is mixed with a solution of chloride of gold.

If the articles gilt are of a dark colour they are brightened by dipping them in a very weak solution of nitrate of mercury and again gilt. The excess of mercury may be removed "by an acid "assisted by voltaic action" of a battery.

In silvering articles by dipping them the coating is thickened by repeated dippings in different solutions, varying in their constituents, so as to produce a dissimilarity between the coating deposited and the solution.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 378; Mechanics' Magazine, vol. 39, p. 31; Engineers and Architects' Journal, vol. 5, p. 358, and vol. 6, p. 303.]

A.D. 1843, January 12.—N° 9586.

RODGERS, JULIAN EDWARD DISBROIVE.—"Improvements "in the separation of sulphur from various mineral substances." These consist in conveying steam through a furnace or retort in which pulverized metallic sulphurets are roasted or calcined. The hydrogen combining with sulphur forms sulphuretted hydrogen; the oxygen forms an oxide of the metal.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 7; Mechanics' Magazine, vol. 39, p. 428.]

A.D. 1843, January 14.—N° 9591.

VIVIAN, HENRY HUSSEY, and GOSSAGE, WILLIAM,—"Improvements in treating or reducing ores of zinc, also certain "improvements in furnaces to be used for reducing ores of zinc," &c. The ores are calcined and subjected to distillation in closed vessels heated externally. Suitable deoxydising gases, as carburetted hydrogen alone, or mixed with carbonic oxide, are passed through the vessels used for the operation of distillation and condensation. A partial vacuum is obtained in the vessels used for distillation by providing "a communication between such vessels and a chimney "draft, or any similar draft." Furnaces for reducing zinc ores are also described with the aid of drawings.

[Printed, 1*s*. 9*d*.]

A.D. 1843, March 16.—N° 9665.

BETTS, JOHN THOMAS.—"Improvements in the manufacture "of metal covers for bottles and certain other vessels, and in the

"manufacture of sheet metal for such purposes." The covers for bottles or capsules are made of metallic tin by stamping apparatus. Sheets of tin, or alloy of lead and tin, are formed by pouring the metal on a long flat cast-iron table, from a moveable melting pot. The sheets may be afterwards rolled.

[Printed, 4s. 3d.]

A.D. 1843, April 7.—N° 9690.

BOYDELL, JAMES, junr.—"Improvements in manufacturing "bars of iron with other metal."—These relate to a mode of coating iron with steel by rolling bars formed with piles of iron and steel, the steel forming the external surfaces of the pile.

[Printed, 3d. See Repertory of Arts, vol. 3 (*enlarged series*), p. 45.]

A.D. 1843, April 11.—N° 9692.

MICHELL, JOHN.—"Improvements in extracting copper, iron, "lead, bismuth, and other metals or minerals from tin ore." The tin ores are crushed and are treated with acid, by preference with muriatic acid diluted with an equal quantity of water, and then washed. About 1 cwt. of acid is allowed to act upon each ton of the ores, for three or four days, until the metals mixed with the tin are dissolved and the tin is left. The ores should be submitted to the acid while warm, or heat may be applied to the bath. Oxide ores should always be previously calcined.

[Printed, 3d. See Repertory of Arts, vol. 3 (*enlarged series*), p. 41; London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 418; Mechanics' Magazine, vol. 40, p. 14.]

A.D. 1843, April 20.—N° 9703.

RAND, JOHN.—"Improvements in the manufacture of tin, and "other soft metal tubes." The tin or other soft metal is cast in the form of a short cylinder. This is elongated into a tube by pressure in suitable dies on a mandril, both being lubricated with grease to aid the drawing of the soft metal.

[Printed, 9d. See Repertory of Arts, vol. 3 (*enlarged series*), p. 27.]

A.D. 1843, May 4.—N° 9720.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—"Improved "processes for coating metals." Metallic surfaces are coated with

tin by dipping them in a solution of a soluable salt of tin, such as the chloride, prepared by pouring muriatic acid upon tin. About two or three quarts of the solution are mixed with 100 gallons of water, and placed in a wooden tank. The bottom is covered with pieces of metallic zinc, on which the metallic surface or plate is placed, another layer of zinc, and another plate may be placed thereon; in from one to four hours the surfaces will be tinned, They may then be coated with a thicker coating of tin or its alloys. as tin and lead, by dipping them in a bath of molten metal. Or the plate may be coated by passing it through rollers, so arranged that the molten metal is kept in contact with the rolled surfaces. The bath of molten metal may be covered with a flux composed of two parts oil or tallow, two parts chloride of zinc, and one part salammoniac.

[Printed, 1*s*. See Repertory of Arts, vol. 2 (*enlarged series*), p. 353. London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 37; Mechanics' Magazine, vol. 39, p. 369.]

A.D. 1843, May 15.—N° 9724.

NEWTON, William Edward.—"Certain improvements in "the construction of boxes or axletrees of locomotive engines and "carriages, and for the bearings or journals of machinery in "general," &c.—(*A communication from Isaac Babbett, of Boston, U. S.*) The boxes or bearings are of brass or gun metal, and are lined or coated with any of the harder kinds of metallic alloys, such as Britannia metal or pewter, or other alloys of tin. 50 parts of tin, 5 of antimony, and 1 part of copper, form an excellent alloy. Suitable fillets or projecting rims may be used for keeping the lining or coating of alloy in its place. The alloy, commonly known as Babbett's metal, resists wear and lessens friction.

[Printed, 7*d*.]

(The validity of the Letters Patent was recognised in the case of Newton *v.* Vaucher tried before Mr. B. Platt, at Liverpool, April 7, 1851. Although metal linings of a similar kind had been applied as packing for the pistons of steam engines, the application of the alloy to the bearings and journals of machinery was held to be new, and good subject matter for Letters Patent.)

A.D. 1843, May 30.—N° 9748.

NEWTON, William.—"Improvements in obtaining copper "from copper [illegible] part or parts of which improvements are

" applicable to obtaining certain other metals contained in some " copper ores."—(*A communication.*) A description is given of the ordinary mode of treating copper ores, and obtaining from the rough calcined ores " coarse metal," from which the sulphurets called "blue metal," "white metal," and " pimpled metal," are obtained. These are "roasted" and made to produce coarse copper, which being "refined," yields "fine copper or tough " copper.' When the ores contain a certain proportion of other metals, as gold or silver, which it is desirable to recover, the " blue," " white," or "pimpled" metals undergo a short process of roasting, followed by a melting. This produces two products in addition to the slag—an upper layer, containing copper and iron, as sulphurets, and also other metals, and is called the " regulus;" the under layer contains also copper, and some sul-" phur and iron, and a larger proportion of the other metals, as gold and silver, it is termed "residual coarse copper." The specification then proceeds to give minute directions for obtaining copper from "coarse metal," or " blue, white, or pimpled metals" and "regulus," by converting the sulphurets of copper (by reducing them to a powder and burning them slowly in a furnace) into "sulphated materials," or sulphate of copper and oxide of copper, and dissolving them in sulphuric acid and water, leaving a residum called "sulphated residuum." The sulphates of copper may with advantage be melted with the "metals and regulus" above described. The sulphate residuums containing the precious metals, are mixed with suitable " sulphuret materials," or with litharge, and gold and silver are obtained by lixivation, cupellation, or elignation, as described.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 325.]

A.D. 1843, June 10.—N° 9764.

BOUSSOIS, Edouard Joseph François Duclos de.—" Improvements in the manufacture of lead, tin, tangsten, copper, " and zinc, from ores and slags and other products, and in the " manufacture of their alloys with other metals." Furnaces are described for calcining and melting metals, and collecting the fumes and volatile products thereof. The furnaces are closed and

are provided with blast injection pipes, and suitable eduction pipes, and vessels and chambers containing water, through which the gases, fumes, and other products are forced. Ores of volatile metals, when pulverised, may be mixed in a paste with slacked quicklime—2½ cwt. of lime to the ton of ore. The paste is spread on a floor to the depth of 2½ inches, is cut up into shapes like bricks, and heated and calcined from below. The ores are then charged with fuel in the furnace and melted. Methods of melting and separating mixed ores, as iron and copper, also, of treating ores and slags with acids, and of treating and reducing sulphurets, sulphites, and sulphates, are described.

Tin may be advantageously manufactured from its ores in the condensing furnaces. When tin is obtained from slags, fluxes of lime or limestone should be added. The alloyed metals obtained may be dissolved in muriatic or sulphuric acid; "in the first place the tin and iron, if any, will be dissolved, leaving tungsten untouched; the tin is then precipitated; or by using sulphuric acid properly diluted, iron is dissolved, leaving tin and tungsten, which may be fused together by the aid of "a proper alkaline or "other flux," and form a valuable alloy. Tungsten may be thus obtained, from tungstate of lime; it may be obtained from its ore called "woolfran," by treating and reducing it "by the use of an "alkaline base, carbon, and sulphur, in a proper furnace or cru-"cible, at a high temperature." The product is dissolved in muriatic or sulphuric acid, and metallic tungsten is obtained. By using oxides of tin, copper, or iron with proper fluxes in the process, the respective alloys may be obtained.

Copper is manufactured from its ores slags by converting them into "the state of carbonate or oxides, by a proper and prepa-"ratory calcination," and treating them with "sulphuric acid in "the gaseous state," as described. Apparatus suitable for producing sulphuric acid from sulphurets of metals is described.

Useful alloys of tungsten and other metals are formed by combining 60 to 95 parts of tin or copper, or their alloys, and 40 to 5 parts, of tungsten of zinc and tin alloy 95 to 97 parts, with tungsten 5 to 3 parts. Pure metals must be used. An alloy of copper and zinc is made in closed vessels as described, and tin in small quantities may be advantageously added thereto.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 101.]

A.D. 1843, June 15.—N° 9775.

BESSEMER, HENRY.—" Certain improvements in the manu-" facture of bronze and other metallic powders." The metal or alloys of metal should be first reduced to very thin leaf, so that a pound may extend over about 850 superficial feet.

The leaf is extended upon a sieve, olive oil is poured thereon, and forced with the leaf through the sieve, and both are mixed and ground in a suitable grinding machine described with drawings. The oil is afterwards pressed out from the metallic powder by putting them in bags, and subjecting them to the action of a hydraulic press. The residuum is allowed to crumble, and is reduced to the condition of bronze powder.

[Printed, 10*d.*]

A.D. 1843, June 15.—N° 9786.

BARRATT, OGLETHORPE WAKELIN.—" Improvements in gild-" ing, plating, and coating various metallic surfaces." A voltaic battery is described, in which lead is used as the positive metal, and carbon for the negative element. The exciting liquor is produced by dissolving one part of chloride of sodium in three parts of water. A supply plate of the metal to be deposited is connected with the carbon; the surface to be coated is connected with the lead. "The products of the battery are chloride of lead " and caustic soda, mixed with carbonate of soda, the value of " which products is considerably greater than the expense incurred " in the deposition of the metal."

Zinc, carbon, and water are used to form a battery. A combination of stationary magnets, the north pole of one being connected with the south pole of another, is used for producing electric currents. A solution for silver is formed by dissolving in water equal parts of nitrate of potash, and chloride of sodium, and sulphate of alumina and potash.

Metallic silver may be dissolved in a solution of chloride of sodium, or byposulphite of soda, or cyanide of potassium.

Or four parts of chloride of sodium, and one part of boraic acid may be dissolved in 20 parts of water.

Or 20 parts of chloride of sodium, 7 parts of tartaric acid may be dissolved in from 80 to 100 parts of water.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 28.]

A.D. 1843, June 23.—N° 9800.

TROUGHTON, Nicholas.—" Improvements in dressing ores " requiring washing." The ores are crushed and are placed in sieves. The sieves are plunged into water in such a manner that while the particles are held in suspension, a horizontal motion is given to them, so that the lighter particles, which are the longer time in falling, will be carried further in a horizontal direction than the heavier particles which fall more quickly. Sieves and apparatus for moving them and for supplying the water are described with the aid of drawings.

[Printed, 10*d*. See Repertory of Arts, vol. 3 (*enlarged series*), p. 129; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 318; Mechanics' Magazine, vol. 40, p. 383.]

A.D. 1843, October 5.—N° 9899.

BODMER, John George.—" Improvements in grates, furnaces, " and boilers, and also in manufacturing and working iron or other " metals, and in machinery connected therewith." Furnaces for melting metals are described with the aid of drawings. Moveable rocking grate bars are used for the fire place to regulate the supply of fuel, and keep it in motion. A converting furnace is described for manufacturing steel by a continued succession of charges. Apparatus for heating the hot blast is also described.

[Printed, 1*s*. 9*d*. See Mechanics' Magazine, vol. 40, p. 271; Engineers and Architects' Journal, vol. 7, p. 153.]

A.D. 1843, October 12—N° 9903.

CLEAVER, John. — " An improved furnace for subliming or " reducing to a metallic state the ores of zinc." The specification and drawings describe a furnace for subliming zinc in which ten pots are used; they are so arranged that the heat of the fire circulates freely about the sides of the pots, as they stand side by side on the pot hearth. The pots are connected with suitable condensing chambers, and flues and ventilators are provided for carrying off the fumes and vapours.

[Printed, 1*s*. 1d.]

A.D. 1843, October 18.—N° 9909.

NEVILL, RICHARD JANION.—" An improved mode of separating " certain metals, when in certain states of combination with " each other:" this relates to a mode of separating silver and lead, or either of them, from argentiferous copper. The copper with which silver is combined is melted and poured into a vessel containing molten lead, maintained at a red heat. The argentiferous copper being well mixed with lead, in suitable proportions, the silver has great affinity for and combines with the lead. As the mixture cools, the copper, with small proportions of lead and silver, rises to the surface, and is removed by tongs or perforated iron plates or ladles. The silver and lead remaining are treated by the ordinary cupellation or other process. The compound metal, copper, silver, and lead, must be broken in small pieces, and treated by the "eliquation" process; it is put with charcoal in retorts, and heated; by preference, closed cast iron retorts, about 3 feet long, and 6 inches square, are used; they are fixed in an inclined position, in a suitable furnace, and have a door at one end which allows the silver and lead to run out. The retorts should be so constructed and charged that atmospheric air is excluded therefrom.

[Printed, 3d. See Repertory of Arts, vol. 4 (*enlarged series*), p. 52; Mechanics' Magazine, vol. 40, p. 317; Engineers and Architects' Journal, vol. 7, p. 154.]

A.D. 1843, October 11.—N° 9911.

DETMOLD, JULIUS ADOLPH. — "Improvements in the con" struction and arrangement of furnaces or fire-places applicable " to various useful purposes;" the Specification and Drawings " describe furnaces having deep grates (from 3 to 5 feet deep), so that a thick stratum of fuel may always be upon the bars. Instead of relying on the draught of a tall chimney a blast of air is forced under pressure into a closed ashpit, and up through the grate. The combustion of the gases and fumes given off by the fuel is insured " by forcing amidst them, in their passage over " the fire bridge, heated and compressed atmospheric air, supplied " in numerous small streams. Furnaces for reducing, refining, and otherwise working metals, are constructed on this principle.

[Printed, 11*d*. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 73; Mechanics' Magazine, vol. 40, p. 379.]

A.D. 1843, October 18.—N° 9912.

GRAHAM, JAMES.—" Improvements in the construction of pots " or vessels, and furnaces used in the manufacture of zinc, and in " other manufactures; and also improvements in the treatment of " the ores of zinc in the process of manufacturing zinc." The Specifications and Drawings describe, first, apparatus for moulding and making melting pots.

2nd. Furnaces for manufacturing zinc; these have fifteen pots for distillation, arranged so that the heat has access to them on all sides, suitable pipes and condensing apparatus are connected with them.

3rd. Furnaces for manufacturing antimony; these are similar to those used for zinc, except that the pots are placed about 4 inches above the bed of the furnace, so that heat circulates below them.

4th. Closed vessels, or a closed furnace, for roasting blende; the blende is broken small, and the gases and fumes evolved are collected by suitable pipes and condensing apparatus, and used in manufacturing sulphuric acid. A similar furnace is used for calamine, and the production of carbonic acid.

[Printed, 2*s*. 9*d*. See Mechanics' Magazine, vol. 40, p. 318; Repertory of Arts, vol. 5 (*enlarged series*), p. 1; Engineers and Architects' Journal, vol. 7, p. 199.]

A.D. 1843, November 2.—N° 9920.

STAGG, JOSEPH DICKINSON.—"A new and improved plan for " collecting, condensing, and purifying the fumes of lead, copper, " and other ores and metals, &c." The fumes and volatile particles given off in manufacturing lead, copper, and zinc, or other ores, are collected by passing them through water in an air-tight closed vessel. The air is exhausted from above the surface of the water by means of suitable exhaust apparatus.

[Printed, 6*d*. See Engineers and Architects' Journal, vol. 7, p. 196.]

A.D. 1843, November 25.—N° 9964.

VIVIAN, ALEXANDER.—" An improved apparatus for dressing " ores." A cistern is connected with self-acting feeding and washing apparatus for washing ores. Gratings or perforated plates are used to arrest the metallic particles as the water employed flows down an inclined plane.

rs and Architects' Journal, vol. 7, p. 236.]

A.D. 1843, November 25.—N° 9968.

DRAYTON, THOMAS.—" Improvements in coating glass with " silver, &c. without using mercury." A solution of silver is formed by mixing 1 oz. of pulverized nitrate of silver or lunar caustic with ½ oz. of spirits of hartshorn, and 2 oz. of water. The mixture after standing for about 24 hours is filtered, and 3 oz. of spirit (by preference spirits of wine, 60° above proof,) are added, with 20 to 30 drops of oil of cassia. In 5 or 6 hours the mixture may be applied to the surface of the glass, by pouring it thereon. A few drops of a compound of 1 part oil of cloves and 3 parts spirits of wine are added to the mixture, either while it is on the surface of the glass or just before it is poured. In about 2 hours a coating of silver will be deposited on the clean surface of the glass. About 18 grains of nitrate of silver will be required for a square foot of glass.

[Printed, 3*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 54; London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 421; Mechanics' Magazine, vol. 41, p. 125.]

A.D. 1843, December 5.—N° 9974.

NEWTON, WILLIAM.—" Improvements in extracting certain " metals from ores and other compounds of these metals," &c.— (*A communication.*) The ores and compounds referred to are those containing sulphurets of copper and iron, or of lead or zinc. The improvements relate to the calcination of the ores in furnaces, described with the aid of drawings. They are so constructed that the ore or compound is not directly acted upon by the flames of the fuel, and the gas produced by calcination is obtained unmixed with smoke, the calcination is effected gradually by introducing the ores or compounds into that part of the apparatus which is least heated, and afterwards moving them into the more heated parts. The calcining furnace may be connected with a smelting furnace, and be heated by the waste heat produced from the latter. The calcined ores are then transferred in a heated state, directly from the calcining to the smelting furnace.

The sulphurous acid gas being produced free from smoke by the calcination of the ores, is caused to percolate through coke or coal heated to redness, the gases thereby produced " are mixed " in such a manner and at such a temperature as provide for their " acting upon each other, so as to produce free sulphur."

The sulphurous acid gas may be heated to redness, together with suitable gases containing carbon and hydrogen, or either of them.

[Printed, 1*s*. 5*d*.]

A.D. 1843, December 8.—N° 9982.

SCHOTTLAENDER, JULIUS.—" Improvements in the deposi-" tion upon various felted and other fabrics." Coatings of copper and other metals are deposited upon felted and other fabrics by the electro process. A plate of copper or other metal has one side rubbed with plumbago, the other varnished. On the plumbago side is fixed the cloth, in close contact with the surface of the copper. The plate and cloth are immersed in a suitable metallic solution, and connected with a battery. A coating of metal is then deposited on the cloth, corresponding to the surface of the copper plate, which may be plain or ornamented by raised or sunken patterns."

[Printed, 7*d*. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 96; Mechanics' Magazine, vol. 41, p. 47; Engineers and Architects' Journal, vol. 7, p. 239.]

A.D. 1843, December 13.—N° 9987.

VAILE, HENRY PURSER.—" Improvements in manufacturing " metals combined with other matters," &c. Sheet metal, as sheet lead, is manufactured with perforated holes. The holes are filled with coloured plastic substances, so as to produce various patterns. The metal sheets so ornamented may be used for covering floors and other purposes.

[Printed, 5*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 152; Engineers and Architects' Journal, vol. 7, p. 239.]

A.D. 1843, December 18.—N° 9991.

COOK, BENJAMIN, junior.—" Improvements in coating or " covering the surfaces of metals," &c. The metal is formed in thin sheets and worked into the required shape. It is then overlaid with a surface of papier mâché, which may be varnished, inlaid, or otherwise ornamented.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 24 (*conjoined series*), p. 428; Engineers and Architects' Journal, vol. 7, p. 284.]

A.D. 1843, December 28.—N° 9999.

BUDD, EDWARD, and MORGAN, WILLIAM.—" Improvements " in the treating or reducing of copper ores, and in the construc- " tion of furnaces for heating such ores, part of which improve- " ments are applicable to other ores." The improvements relate to the application of air heated before it enters the furnace where copper or zinc ore is calcined, or copper or copper metal roasted The air is heated by passing it near to, or in contact with suitably arranged heated flues or ways.

Suitable furnaces are described with the aid of drawings. They are constructed with heating flues formed in the bridge, sides, or other parts of the furnace. The furnace may be divided into two compartments, the upper one being heated directly by the fire, the lower one by the heated products of combustion, which pass from the upper to the lower. The bottoms of the furnaces may be made of iron, or other material, the under surface of which is kept cool by air, water, or other fluid.

[Printed, 1*s*. 4*d*. See Engineers and Architects' Journal, vol. 7, p. 284.]

A.D. 1844, January 1.—N° 10,004.

LONGMAID, WILLIAM.—" An improvement in the manufac- " ture of copper, tin, zinc, and peroxide of iron." The specification of former Letters Patent, dated October 20, 1842 (see *ante*, No. 9496, p. 110,) is referred to. The main object of the process therein described was to obtain sulphate of soda, the metals produced being considered a beneficial addition thereto. But ores containing copper, tin, and zinc, with sulphur, may be advantageously treated with common salt, in less proportions than 60 by weight of salt to 40 by weight of the sulphur contained in the ores. The pulverized ores are mixed with dried salt, and heated in a suitable furnace, in such proportions of salt relative to the sulphur contained therein that the metallic parts of copper and zinc are obtained in such a state as to be readily soluble in water. The heated products are withdrawn from the furnace after about 20 or 24 hours, and lixiviated in the usual way. If an insoluble residuum is left it is treated with weak muriatic acid, obtained by condensing the products evolved from the furnace, in which the ores and salt are operated upon. Peroxide of iron and oxide of tin may be obtained by these processes, as described.

[Printed, 4*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 97; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 22.]

A.D. 1844, February 12.—N° 10,049.

NEWTON, William Edward.—"An improvement or im-
"provements in furnaces."

[No Specification enrolled.]

A.D. 1844, February 14.—N° 10,053.

KURTZ, Andrew.—"Improvements in apparatus to be employed for drying, evaporating, distilling, torrefying, and calcining." Evaporating, or distilling, or calcining vessels or chambers are described, in which the heated flames and products of combustion are made to pass through a series of metallic tubes or pipes, ranged side by side, and placed above the vessel or chamber, between it and a covering of brickwork. A flue from the pipes may be made to pass beneath the vessel, and communicate with the chimney.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 31.]

A.D. 1844, February 17.—N° 10,056.

HOOD, John Lionel.—"An improved composition or mixture "of metals applicable to the manufacture of sheathing for ships "and other vessels, bolts, nails, or other fastenings." Various combinations formed in "atomic ratio," taking the prime equivalent of copper at 32, are described:—

	Atoms.		Per cent.		Atoms.		Per cent.
Copper - -	16	or	40·4	or	32	or	45·5
Zinc - -	15	or	38·0		30	or	42·2
Lead - -	2	or	16·5		2	or	9·0
Antimony - -	1	or	5·1		1	or	2·0

Instead of antimony, tin may be used also in atomic ratio.

	Atoms.		Atoms.		Atoms.		Atoms.		Atoms
Copper - - -	8		10		8		12		14
Zinc - - -	8	or	10	or	7	or	12	or	14
Lead - - -	1		1		1		1		1

	Atoms.		Atoms.		Atoms.		Atoms.		Atoms.
	16		10		8		5		8
or	16	or	5	or	6	or	2	or	5
	1		2		1		1		1

Iron may be employed, one atom or 28 parts of the pure metal being combined with any given number of atoms or equivalents of copper, the zinc being employed in atomic ratio.

Other combinations may be formed, in which the copper ranges in proportions not exceeding 50 per cent. The copper should be melted first, the other metals being added afterwards. The zinc should be held under the surface of the copper by a pole, to prevent its volatilization. The molten metal may be well stirred with a wooden pole, which is burnt in the operation. Charcoal may be thrown on the surface of the metals. Plates formed of these alloys may be rolled hot or cold, care being taken to anneal them properly in the latter case.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 306.]

A.D. 1844, February 21.—N° 10,063.

PARKES, ALEXANDER.—" Improvements in the manufacture of " certain alloys or combinations of metals, and in depositing cer- " tain metals."

[No Specification enrolled.]

A.D. 1844, March 14.—N° 10,100.

KNELLER, WILLIAM GODFREY.—" Improvements in the pre- " paration of zinc, and in combinations of zinc with other metallic " bodies." These consist, first, in melting zinc with lead in about equal quantities, and adding powdered charcoal, and retaining them in a melted state about three hours. The surface is skimmed; the lead will descend to the bottom and zinc in a very purified state, fit for being alloyed with copper, will be at the surface. Seven cwt. of lead and seven of zinc may be melted together. If an alloy of zinc and lead be required at the end of an hour draw off the zinc, leaving about an inch of depth on the lead. Let the metals cool and skim off cakes from the surface as they are formed; these cakes form a useful alloy of lead and zinc.

[Printed, 3*d*. See Repertory of Arts, vol. 4 (*enlarged series*), p. 358; London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 187.]

A.D. 1844, April 27.—N° 10,159.

WALL, ARTHUR.—" Certain improvements in the manufacture " of steel, copper, and other metals."

[No Specification enrolled.]

A.D. 1844, May 30.—N° 10,207.

LEE, JOHN.—" Improvements in obtaining products from sul-" phurets and other compounds containing sulphur." Furnaces are described for decomposing sulphurous acid gas, by passing it " through and amongst coke, coal, or other carbonaceous matter, " heated to a full red heat to obtain sulphur. The sulphurous acid gas is obtained " by burning sulphuretted hydrogen gas with atmospheric air," the former being produced from the sulphurets of potassium, sodium, or calcium, or alkali makers' waste.

[Printed, 10*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 20.]

A.D. 1844, May 30.—N° 10,208.

FENTON, JAMES.—" An improved combination or alloy, or im-" proved combinations or alloys of metals." An alloy which may be used instead of brass or copper for bearings, journals, steps, rollers, and other purposes, is thus formed:—Fuse 32 parts of copper in a crucible; add thereto 1 part of sheet brass, and afterwards 15 parts of block tin. This alloy forms a " hardening " metal plate," and constitutes the first part of the process. 2ndly. Take 2 parts of the hardening metal, 19 parts of zinc or spelter, or as many parts of calamine as are equal thereto, and 3 parts of block tin. Fuse the zinc, spelter, or zinc in a large vessel, covering the surface with powdered charcoal; add thereto the hardening metal, which should be fused in a separate vessel; stir the metals and add the block tin. Stir again with suitable implements; then run the mixed metal into castings or ingots.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 402; Engineers and Architects' Journal, vol. 8, p. 31.]

A.D. 1844, June 4.—N° 10,218.

GRIFFITHS, PAUL.—" Improvements in washing the products " evolved from furnaces." The products of combustion given off from furnaces in which copper, zinc, or other ores are worked, are conducted by suitable flues or passages into a collecting chamber. Into this chamber water is introduced in a finely divided state or spray, and mixed with the products of combustion. The chamber is of an elongated form; the bottom of it is covered to some

depth with water, above which fans are made to rotate, and so throw up the spray, while by their revolution they draw off the products of combustion, and mix them with the water, and enable them to be collected.

[Printed, 9*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 11.]

A.D. 1844, June 8.—N° 10,222.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—" Improve-" ments in coating iron with other metals." Metallic articles such as iron ores, which are intended to be coated with tin or lead, or its alloys, should be cast in metallic moulds, to give them a suitable surface. When they have been treated with pickling liquor they are dried in suitable closed vessels or chambers filled with vapours of sal ammoniac, or chloride of zinc, or other vapours that will not act injuriously on the surface of the metal, atmospheric air being excluded.

The waste tin obtained in the tinning process is heated to a dull red heat, to decompose any oil or tallow which may have been mixed with it. It is then treated with muriatic or other acid, and converted into chloride of tin or other useful salt of tin.

Sheets of iron may be coated with lead or lead alloyed with small proportion of tin, not exceeding 15 per cent., by using a flux consisting of 3 parts of sal ammoniac, and 1 part chloride of zinc, without oil or fatty matter; or 1 part chloride of tin and 3 parts sal ammoniac, with or without oil or fatty matter. The fluxes are put on the molten metal separately.

The leaden coating may be hardened by mixing antimony therewith.

[Printed, 4*d*. See Repertory of Arts, vol 5 (*enlarged series*), p. 37; Engineers and Architects' Journal, vol. 8, p. 31.]

A.D. 1844, June 24.—N° 10,235.

SHAW, JAMES.—" Improvements in the manufacture of metal " dish covers and metal dishes." Excentric lathes and other apparatus are described, with drawings, for making oval hollow forms of soft metals and alloys.

Britannia metal and other similar alloys may be hardened by heating them in a bath of fatty matter or oil, such as whale oil.

[Printed, 9*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 134.]

A.D. 1844, July 10.—N° 10,256.

NEWTON, WILLIAM.—" Improvements in the manufacture of " wire from zinc,"&c.—(*A communication.*) Sheets of zinc are cut into strips of suitable sizes; the strips are passed through grooved rollers, and then through the holes of a draw plate. The draw plate should be greased; and the operations are performed, by preference, without heat being applied.

[Printed, 9*d.* See Mechanics' Magazine, vol. 42, p. 439; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 311.]

A.D. 1844, July 31.—N° 10,282.

FONTAINEMOREAU, PIERRE ARMAND LE COMTE DE.— " Improvements for coating or covering metals and alloys of " metals."—(*A communication.*) A process of coating metals and their alloys with red or yellow copper is described. The metals are cleansed from oxides by immersing them in "a concentrated " solution of the carbonated residuum of cyanuret of potassium" and scrubbing them.

Metallic salts having copper and prussiate of potash (cyanite of potassium), or copper and cyanuret of potassium, are then prepared in the mode described.

A description is next given of fourbaths : (1), an alkaline solution of copper containing cyanuret of potassium, salt of copper and sulphate of potash; (2), an alkaline solution of copper without the cyanuret of potassium; (3), a solution of sulphate of copper acidulated with sulphuric acid; (4), a solution of fused cyanuret of potassium, and sulphate of zinc mixed warm, and one of the metallic salts above described.

The galvanic process is employed, and the articles are first coated in solutions 1 or 2 with a fine coat, then in 3 with a thicker coat. To give a yellow coat the articles are immersed in solution 4. Heat may be applied during the process by means of steam pipes. Solution 4 may be varied by adding salts of tin, lead, nickel, cobalt, antimony and others. Iron should be first tinned before it is coated with the copper or its mixture.

[Printed, 4*d.*]

A.D. 1844, October 10.—N° 10,342.

RITCHIE, WILLIAM HENRY.—" Improvements in obtaining " copper from ores." These consist in using galvanic currents

for precipitating copper "the exciting liquor being used in contact " with the solution of copper." The ores are calcined or roasted, and sulphate of iron or zinc in the crystallised form is mixed with them in water, in a suitable vessel. A cast iron plate is introduced and connected with the battery, and the copper is precipitated thereon.

[Printed, 5*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 383; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 252; Mechanics' Magazine, vol. 42, p. 440; Engineers and Architects' Journal, vol. 8, p. 168.]

A.D. 1844, October 10.—N° 10,343.

BROWN, John Bower.—" Improvements in combining cast steel with iron," &c. A block of iron is heated and placed in a suitable mould, melted cast steel is poured into the mould around the iron, and forms with it a solid mass with the steel outside, it is afterwards drawn or rolled out into the shapes required.

[Printed, 3*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 30; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 112; Mechanics' Magazine, vol. 43, p. 58; Practical Mechanics' Journal, vol. 3, p. 69; Engineers and Architects' Journal, vol. 8, p. 264.]

A.D. 1844, October 22.—N° 10,362.

NAPIER, James.—" Improvements in treating mineral waters " to obtain products therefrom, and for seperating metals from " other matters." Sulphuric acid is added to mineral waters which are impregnated with copper or other metals, iron is then placed therein, in a tank in the usual way, the oxide of iron formed by galvanic action is dissolved, and a clean surface is always presented to the copper salt; a protosulphate of iron is held in solution which may be obtained by evaporation. Economy in the use of the iron is effected by reducing the persulphate of iron to a protosulphate, by employing sawdust which is thrown into the tank with the sulphuric acid. The iron as well as the copper may be recovered by evaporating the charged water, and crystallizing the deposits. Metallic ores in a fused state are treated with electric currents to cause a separation of the metallic particles.

[Printed, 4*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 48; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 402.]

A.D. 1844, October 29.—N° 10,366.

PARKES, Alexander.—" Improvements in the manufacture " of certain alloys or combinations of metals and in depositing

"certain metals." I. A white or pale coloured malleable alloy is thus formed. To form about 100 lbs. of alloy, mix 33½ lbs. of "foreign zinc," 64 lbs. of tin, 1¼ lbs. of iron, 2¼ lbs. of copper; or 50 lbs. of zinc, 48 lbs. of tin, 1 lb. of iron, and 3 lbs. of copper; or intermediate proportions may be used. Fuze the copper and iron, add the tin, and then the zinc. A flux composed of 1 part Cumberland ore and 3 of sal ammoniac, by weight, may be used.

II. Take 66 lbs. of "foreign zinc," 32¼ of tin, 3¼ of antimony; or 79¾ lbs. foreign zinc, 19½ lbs. of tin, 2¾ lbs. of antimony; or intermediate proportions. These metals melt at a low heat. Ordinary "black flux" may be used. This alloy may be roLed cold for sheets. To make ships' sheathing, add 8 to 16 oz. of metallic arsenic to 100 lbs. of the alloy.

III. A white metal resembling German silver is formed of zinc, copper, iron, and metal. Fuse first the iron and nickel in equal proportions or 2 of iron to 1 of nickel. Take of the iron and nickel alloy 45½ parts, add 45½ parts of copper and 10½ of foreign zinc; or 30¾ parts of the nickel and iron, 46 of copper, and 26¼ of zinc; or intermediate proportions.

IV. Alloys of silver, nickel, and copper which do not oxydise readily, are thus formed: take of copper 60 parts, nickel 20 parts, silver 20 parts; or copper 60, nickel 10, silver 10, and zinc 20. First fuse the copper and nickel, by preference, with flux.

V. Nickel, iron, and copper form a usefu alloy, a non-conductor of heat. Fuse of nickle 25 to 15 parts, iron 25, and copper 50 to 60 parts.

VI. In depositing metals by the electro process, salts of the metals, as iodides, chlorides, and phosphates, and their compounds, are used in a state of fusion. They are fused in a suitable vessel made, by preference, silver or iron enamelled. To plate articles, a plate o silver is suspended in the fused salts or compounds, for instance, 6 lbs. of chloride of silver, in connection with the negative pole of a battery, and the article is connected with the positive pole in the usual way. 3 lbs. of iodide of potassium might be used with 6 lbs of iodide of silver; iodides of copper or mercury might be used. With 20 oz. of iodide of gold, 80 oz. of iodide of potassium or sodium might be used.

[Printed, 4d. See Repertory of Arts, vol. 6 (*enlarged series*), p. 32; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 378; Mechanics' Magazine, vol. 48, p. 88; Engineers and Architects' Journal, vol. 8, p. 264.]

A.D. 1844, November 2.—N° 10,378.

BRUNTON, William, junior.—" Improvements in apparatus " for dressing ores." Crushed ores are placed upon a moveable table consisting, by preference, of an endless band or web of cloth with rope edges and cross pieces of wood attached thereto. A suitable vibratory and progressive motion is given to the table or web, and a stream is allowed to fall thereon. The table and materials thereon are moved up against the stream, and the washed particles are collected and deposited above in suitable receptacles.

[Printed, 6*d*. See Repertory of Arts, vol. 5 (*enlarged series*), p. 362; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 194; Mechanics' Magazine, vol. 43, p. 57; Engineers and Architects' Journal, vol. 8, p. 171.]

A.D. 1844, December 12.—N° 10,426.

WEIGER, Joseph.—" Improvements in the amalgamation, alloy- " ing, and soldering of certain metals." Gold, silver, platinum, palladium, are alloyed in various proportions, specially suited for dentists' work. A furnace and crucibles suitable for melting the metals, are described.

The metals are first purified by treating them with acids by the ordinary processes. Palladium is obtained by treating native platinum.

In alloying gold, silver, and palladium and platinum, the first three are fused together, and the platinum is gradually added in a reduced state, as fine powder. Borax is used as a flux " $\frac{1}{8}$ part " of the volume of the metals under operation," and " tartrate of " potassa $\frac{1}{25}$ part." Various combinations of these metals are described, some of which, as $\frac{8}{12}$ gold, $\frac{1}{12}$ silver, $\frac{3}{12}$ platinum, nearly resemble pure gold.

Pure gold or silver, or their alloys, may be used as a solder for soldering platinum.

[Printed, 7*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 93; London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 396; Mechanics' Magazine, vol. 43, p. 78.]

A.D. 1844, December 12.—N° 10,429.

MALINS, William.—" Improvements in constructing roofs " and other parts of buildings of iron or other metals, and in the

" preparation of the materials of which the same are or may be " constructed."

[No Specification enrolled.]

A.D. 1844, December 18.—N° 10,441.

WALL, ARTHUR.—" Improvements in the manufacture of steel, " copper, and other metals." Steel is manufactured from bar iron by "converting" the latter in the ordinary way in common furnaces, or by using about 6 parts of charcoal to 3 parts of chalk, and combining with one bushel of the mixture about 2 lbs. of zinc. The mixture is placed on the bottom of the converting furnace, and carbonic acid oxide is generated, which is made to act upon the iron. Electric currents are passed through the bars, during the process of converting them.

Copper, tin, zinc, and other metals are also subjected to the action of currents of electricity, while in the act of solidification, in such a way that the currents are made to traverse the entire mass of metal.

[Printed, 7*d.* See Repertory of Arts, vol. 6 (*enlarged series*), p. 348; London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 29; Mechanics' Magazine, vol. 42, p. 443; Artizan, vol. 5, p. 256; Patent Journal, vol. 3, p. 459; Engineers and Architects' Journal, vol. 8, p. 297.]

A.D. 1845, February 17.—N° 10,524.

GRAHAM, JAMES.—" Improvements in the manufacture of " zinc, antimony, and brass, in casting brass and in apparatus " for making pots used in such processes." The specification describes improvements founded upon those formerly patented October 18, A.D. 1843, See No. 9912, p. 120. The lower ends of "the " descending pipes" of the pots used in making zinc, are immersed to the depth of 4 to 6 inches in water, suitable outlets being provided for the exit of the gases. The gases are ignited by means of a burner suitably fixed in the pipe. The pressure is thereby removed, and the air is prevented from coming contact with the zinc vapour. A lining of clay or earthen material is used for the descending tubes, which is easily cleaned or removed.

The pots used have a hole made on one side near the bottom, through which they are tapped by a drill.

A cylindrical rammer is used with suitable apparatus for ramming down and making the pots.

[Printed, 4*d.* See Repertory of Arts, vol. 6 (*enlarged series*), p. 180.]

A.D. 1845, April 7.—N° 10,590.

NEWTON, Alfred Vincent.—"Improvements in machinery "or apparatus for forging or stamping metals," &c. A vertical hammer or stamper, lifted by the action of two friction drums, is described with drawings. The hammer stock is connected with the lifting rod by a spring, which prevents sudden jerks or jars from occuring in the working of the hammer.

Suitable cam wheels, having one or more cams, are used to regulate the action of the friction drums, and cause them to raise the hammer once or oftener at every revolution.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 27 (*conjoined series*), p. 423.]

A.D. 1845, April 15.—N° 10,614.

TAYLOR, John.—"Improvements in separating metals from "each other, and from certain combinations with other sub- "stances."—(*A communication.*) The specification of former Letters Patent (see *ante*, No. 9748, p. 114), appears to be referred to, wherein the sulphate residuums, obtained by calcining and dissolving copper ores, is operated upon to obtain silver.

Argentiferous ores are also treated by the following process:— They are ground and calcined thoroughly, if they contain sulphur. The calcined ores are tested by pouring water thereon, if the water be not discoloured calcination is complete. Common salt is then added, 5 parts to 100 parts of calcined material. A chloride of silver is thus formed, it is dissolved in any suitable solvent, as hot saturated solution of common salt, or hyposulphites of alkalis or earths, and silver is precipitated in the usual way.

Another mode of treating argentiferous ores, is to carry on the calcining process, until all the silver therein is converted into sulphate of silver, the compounds of the other metals being rendered insoluble. The sulphate is then treated by the lixiviating process.

[Printed, 4*d*.]

N° 10,614*.

(*Disclaimer enrolled* 1855, *December* 10.)

VIVIAN, Henry Hussey.—Disclaimer of part of John Taylor's specification. The use of other chlorides or substances "except "chloride of sodium (common salt) or of sal ammoniac, or of

" the chloride of the metallic base of an alkali or alkaline " earth," is disclaimed. Chloride of sodium is preferred on account of its cheapness.

[Printed, 5*d*. See Repertory of Arts, vol. 6 (*enlarged series*), p. 298; London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 125.]

A.D. 1845, May 22.—N° 10,679.

FONTAINE-MOREAU, PIERRE ARMAND LE COMTE DE.—" Improvements in separating or dissolving oxides from metals " and metallic substances."—(*A communication.*) These consist in mixing with the acids or other scouring agents used in operating upon the metals certain soluble organic bodies, such as sugar, gums, vegetable extracts, soap glycerine, and other bodies of which 5 classes are mentioned. Tar, oil, or the cakes of oleaginous substances are used by preference. To every 100 gallons of acidulated liquid from 1 to 50 gallons of the organic substance may be added, the object thereof being to prevent the corroding action of the liquid. The operations are in other respects conducted in the ordinary way.

[Printed, 3*d*.]

A.D. 1845, May 22.—N° 10,684.

NAPIER, JAMES.—" Improvements in treating mineral waters " to obtain products therefrom, and for separating metals from " other matters." The improvements relate to a process of recovering the copper held in solution in mineral waters, and in economising the use of the iron employed in the process. As described in this specification, they are similar to those described in a former specification (No. 10,362, p. 129.)

[Printed, 4*d*.]

A.D. 1845, June 5.—N° 10,708.

CLIFF, JOSEPH.—" Improvements in the manufacture of alum " and aluminous compounds," &c. Alumina and iron are separated from the fire or other clays with which they are combined, by grinding, calcining, and treating the clay with suitable acid solutions, with the assistance of heat. The mass is lixiviated in water, iron is precipitated by means of prussiate of potash, gallic

acid, or sulphuretted hydrogen. The residual liquor is evaporated, and sulphate, nitrate, or muriate of alumina corresponding to the acid employed is obtained.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 29; Mechanics' Magazine, vol. 44, p. 107; Engineers and Architects' Journal, vol. 9, p. 92.]

A.D. 1845, August 4.—N° 10,797.

LONGMAID, WILLIAM.—" Improvements in the manufacture " of chlorine, in treating sulphurous ores and other minerals, and " in obtaining various products therefrom." Iron pyrites or other sulphurous ores are heated with common salt in suitable furnaces, and made to produce chlorine as described in the specification of prior Letters Patent, dated October 20, 1842 (see No. 9496, p. 110), and January 1, 1844 (see No. 10,004, p. 123). The process of calcination is carried on until chlorine ceases to be evolved, or nearly so; the charge is then withdrawn and placed in a closed furnace as described.

The proportion of salt employed should be about as 100 of salt to 35 or 40 parts of sulphur found to be contained in the ores. Metallic chlorides as manganese, copper, iron, zinc, and lead are oxidised by allowing the access thereto of atmospheric air deprived of all moisture.

[Printed, 4*d*. See Repertory of Arts, vol. 8 (*enlarged series*), p. 235; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 172.]

A.D. 1845, August 5.—N° 10,803.

MAIRE, PETER FRANCIS.—" Improvements in combining iron and other materials for the purpose of constructing bridges," &c. —(*A communication.*) The specification and drawings describe various combinations of cylinders and rods forming parallelopipedal figures, which are connected together by bolts, so as to form the shapes required."

[Printed, 1*s*. 10*d*.]

A.D. 1845, August 7.—N° 10,805.

BANKART, FREDERICK.—" Improvements in treating certain " metallic ores, and refining the products therefrom." Metallic ores containing copper, whether they contain sulphur or not, are

so treated as to "convert the copper into a soluble sulphate of its "oxide, and separate it from foreign admixtures." This is done by mixing the different ores of copper and iron pyrites, in due proportions, according to the quantity of sulphur they contain, so that those which contain sulphur in excess may compensate for those which are deficient in sulphur. The mixed ores are subjected to a succession of roastings and lixiviations (the proportions of sulphur being adjusted in the residue after each stage), a solution of sulphate of copper is thereby obtained, and copper in a refined state is produced by precipitation.

[Printed, 4*d*. See Repertory of Arts, vol. 7 (*enlarged series*), p. 271; London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 93; Engineers and Architects' Journal, vol. 9, p. 120.]

A.D. 1845, September 18.—N° 10,834.

POLKINGHORNE, James, the Younger.—"Improvements in "treating ores and separating from them the metals which they "contain." Ores of tin, after being pulverised and washed, are calcined, and while hot are precipitated into water, then withdrawn, and again repeatedly washed. The cleansed ores are made into a paste by mixing them with a saline solution, consisting of about 7 parts of muriate of soda, 2½ parts muriatic acid, 2½ parts of sulphate of iron, mixed in water; 10 gallons of the saline solution may be used with a ton of ore. The paste is left "to "work" for from 3 to 7 days; it is then broken up, washed in a suitable machine constructed as described. The foreign matters are dissolved, and the tin is thrown down in a purified state; it is then mixed with a flux composed of soda ash and culm, about 2 cwt. of soda ash and 4 to 7 cwt. of culm to a ton of ore. The metal is then smelted in the usual way.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 28 (*conjoined series*), p. 329; Patent Journal, vol. 1, p. 22.]

A.D. 1845, October 9.—N° 10,859.

MOREWOOD, Edmund, and ROGERS, George.—"Improvements in the manufacture of iron into sheets, plates, or "other forms, in coating iron, and in preparing iron for coating "and other purposes." Rolling apparatus is described for giving to sheet iron corrugated forms.

Iron is coated with copper or its alloys, such as those of tin, zinc, antimony, or bismuth, by first preparing the surface of the

iron by dipping it in a strong solution of sal ammoniac or borax. It is then with care introduced into the bath of molten metal. A bath of molten copper, or its alloys, such as brass, is used with a flux, such as chloride of manganese, "which is " applied in a dry state to the surface of the used metal from half " an inch to an inch in depth."

The parts of the specification describing these coating processes were subsequently disclaimed as not being of sufficient value.

[Printed, 1*s*. 7*d*.]

A.D. 1845, October 9.—N° 10,860.

PARKES, Alexander.—" Improvements in coating or cover- " ing certain metals with other metals and metallic alloys, and for " ornamenting the surfaces of various metallic articles." Gold designs may be produced on silver, or other metal surfaces by attaching any required design, formed by a pattern of paper or other suitable substance, to the surface of the metal. When this is dry, it may be protected by "repellant coatings," while the metallic surface is electro gilt, or electro plated, or bronzed by the ordinary process. The "stopping out" varnish or colour, or repellant substance, is then removed, and its surface is left dead or is burnished. To give the bronze colour to the surface a mixture of muriate of ammonia 1 lb., sulphate of copper 1 lb., distilled vinegar 2 gallons, may be used.

Iron may be coated with zinc, copper, lead, or tin, or with alloys formed of copper and zinc; or copper, nickel, and zinc; or copper, silver, nickel, and zinc; or copper and tin; or copper, zinc, and tin; or copper, lead, and zinc; or antimony, tin, zinc, and lead, by using the metals or alloys in a fused state, with various suitable fluxes composed of chloride of lime 50 lbs., chloride of sodium 50 lbs., borate of sodium, fused, 40 lbs; or chloride of copper 50 lbs., and phosphate of zinc 50 lbs., or the same with borate of soda 10 lbs. Copper and its alloys may be coated with lead, zinc, and tin, by using the process, and some of the numerous and various fluxes described.

[Printed, 4*d*. See Repertory of Arts, vol. 7 (*enlarged series*), p. 358.]

A.D. 1845, October 10.—N° 10,871.

JAMIESON, Alexander, and LUNDHOLM, John Frederick.—" Improvements in dressing ores requiring washing."

[illegible] are placed in cisterns, in which rakes or spikes attached [illegible] are made to [illegible] and agitate the water and its contents. Streams of water are supplied by suitable pipes. The washed and [illegible] iron are subjected to pressure under a hydraulic or other press to press out all moisture. The iron may be delivered in the form of cakes or blocks, to be subsequently operated upon and welded by the ordinary processes.

[Printed, [illegible]. See Repertory of Arts, vol. [illegible] (enlarged series), p. [illegible]; Patent Journal, vol. [illegible], p. [illegible].]

A.D. 1845, November 4.—Nº [illegible].

[illegible], Charles.—"Improvements in combining steel [illegible] iron" [illegible]. The iron intended to be combined or faced with steel is surrounded with a case of sheet iron, and [illegible] steel is then poured between the iron and the case. The steel [illegible] with the iron and the case may afterwards be [illegible] off or removed in any convenient way, leaving iron coated with steel.

[Printed, 7d. See Repertory of Arts, vol. [illegible] (enlarged series), p. [illegible]; Engineers and Architects' Journal, vol. [illegible], p. [illegible].]

A.D. 1845, November 27.—Nº 10,970.

SPENCE, Peter.—"Improvements in the manufacture of "copperas and alum." The refuse matters obtained from burning iron pyrites in the manufacture of sulphuric acid, are subjected to the action of diluted acid, kept at a heat of about 160° to 200° F. A solution of copperas will be thereby obtained, which is afterwards crystallised. Shales and aluminous matters are subjected to repeated digestings in diluted sulphuric acid, so that a liquor is obtained "of a proper strength for crystallization without evaporation."

[Printed 4d. See Register of Arts, vol. 8 (enlarged series), p. 28; Patent Journal, vol. 1, p. 48.]

A.D. 1845, November 27.—Nº 10,971.

POOLE, Moses.—"Improvements to hinder the oxidation of "iron in all its various states of cast metal, steel, malleable iron, "and also to render malleable iron more hard and durable."—(A communication.) From 2 to 10 per cent of tin, copper, nickel,

or antimony may be alloyed with cast iron, according to its quality, and will prevent oxydation, and render it less brittle. Malleable iron is coated with steel or cast metal, containing less carbon than cast iron, and formed by mixing scrap wrought iron therewith. Manganese in proportions of 5 to 10 per cent. may be mixed therewith. Ferro-cyanide of sodium, or of calcium, or of barium, may be used, instead of ferro-cyanide of potassium for hardening iron, as they have a less corrosive effect on its surface.

[Price, 4*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 36. Patent Journal, vol. 1, p. 44.]

A.D. 1845, December 4.—Nº 10,976.

GOSSAGE, William.—"Improvements in obtaining products "from certain ores and other compounds of certain metals." These relate to modes of treating sulphurous ores, or compounds of copper, zinc, lead, and iron, and arresting and collecting volatilized products given off in working these metals, also to furnaces and apparatus for smelting sulphurous ores.

In working copper ores, after a sulphuret of copper or regulus is obtained, a metallic compound called "bottom copper," and containing various metals, is left. Bottom copper is granulated and mixed with sulphurous ores, so that sulphur being present in excess, a sulphuret of copper may be separated therefrom, leaving the other metals compounded with as small a proportion of copper as possible. This operation is repeated until the separation of copper in the form of sulphuret has been carried on to the proper extent. The silver or other metals that may be left in the bottom copper are separated by the usual processes.

Sulphurous ores and compounds of lead are melted with metallic iron in a state of division, granulated or otherwise, metallic lead with or without silver is obtained, and also a sulphuret of iron. The sulphuret of iron is ground and calcined, and converted into metallic iron, in a state of division, and may be used in the process previously described. The apparatus for collecting and condensing volatilized products, consists of a hollow tower or shaft, filled with siliceous pebbles, which are moistened, and present extensive surfaces to the products passed through them. Suitable pipes, reservoirs, and chambers are described. "The draft requisite for the use of the apparatus is "obtained by the action of a descending current of water, passing

" through such apparatus in the same direction as the current of " gases, and volatilized products are conducted through."

A smelting furnace is described, wherein ores and compounds are exposed to the action of flame in conical heaps, instead of being spread upon the bed of the furnace.

[Printed, 5*d.*]

A.D. 1845, December 24.—N° 11,022.

SHEARS, DANIEL TOWERS.—" Improvements in the treatment " of zinc ores," &c.

[No specification was enrolled.]

A.D. 1846, January 29.—N° 11,065.

HOWELL, GEORGE.—" For coating with a metal the surface of " articles formed of copper or copper alloys, or iron wrought or " cast." The articles are coated with platinum by the following process:—The platinum is dissolved in aqua regia. The irridium contained in it separated by filtration. The solution is evaporated by applying heat, which must not be in excess. The residue is treated with caustic potash of equal weight with the platinum dissolved. A "yellowish powder" should be obtained, (" not " greenish, which is the result of over-heating,") a solution of oxalic acid equal in weight to twice that of the platinum is added. The mixture is boiled and filtered, and cooled; caustic potash, three times the weight of the platinum, is dissolved in water and added to the mixture. Articles may then be platinized by immersing them in the solution, and employing the usual electro processes. Instead of "oxalic acid, tartaric, citric, and acetic " acids, and oxalate and tartarate of potash" may be used to form the solution of the salt of platinum. Instead of caustic potash soda may be used, or "the ready-made double salt of chlorides of " potassium and platinum can be taken."

[Printed, 3*d.* See Patent Journal, vol. 1, p. 179.]

A.D. 1846, February 11.—N° 11,083.

SMITH A[illegible]EW.—" Improvements in coating or covering [illegible]ose of preventing oxidation." The bath of

molten zinc used in coating metals is contained in a pan, which is suspended inside another pan or vessel.

The space between the two pans is filled with a bath of lead, or lead and tin, or some alloy that melts at a lower heat than zinc. The heat from the furnace acts directly on the outer pan, and is communicated through it and its contents to the bath of zinc, which may be thereby maintained at the requisite temperature without the zinc corroding the pan containing it.

[Printed, 9*d*. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 319; Artizan, vol. 5, p. 158; Engineers and Architects' Journal, vol. 10, p. 26.]

A.D. 1846, March 11.—N° 11,123.

BARRUEL, JEAN JOSEPH ERNEST.—"Improvements in work- " ing of certain sulphurets," &c. These relate to processes used for converting sulphuret or sulphate of zinc into the metal or oxide of zinc, and the sulphuret of antimony into oxide of antimony, and for collecting the oxide of antimony obtained from the sulphuret or equivalents.

The sulphuret or sulphate of zinc, or the sulphuret of antimony, are mixed with, 1st, carbon or peroxide of manganese; or, 2ndly, with carbon and the sesquioxide of iron; or, 3rdly, with carbon and calcareous substances, as carbonates of lime, chalk, or marble. Specific proportions are given, which vary according to the quality of the sulphuret. The mixture is submitted in suitable apparatus to the action of heat. Distilling and collecting and condensing apparatus is described for collecting the oxide of antimony.

[Printed, 4*d*. See Patent Journal, vol. 1, p. 275.]

A.D. 1846, June 29.—N° 11,262.

STIRLING, JOHN DAVIE MORRIES.—"Certain new alloys and " metallic compounds, with a method of welding the same and " other metals."—A hard alloy, capable of receiving a high polish, and suitable for being made into cutting instruments, also into cells, is made by fusing cast iron, and adding thereto $\frac{1}{4}$ to $\frac{1}{5}$ of its weight of tin. The tin must be added so as to form a "sa- " turated compound called a hardening metal or alloy." Charcoal is placed on the surface of the fused metals to prevent oxyda-

tion. To melted cast iron the hardening alloy is added, so that ⅛ of tin may be present in the compound. Care must be taken to prevent oxydation. Hot blast iron requires the larger proportion of tin.

To produce tough hard iron suitable for shaftings, cranks, or girders, malleable iron is combined with cast iron by introducing it into the moulds, or molten cast iron, and remelting the compound. The wrought iron may be heated to a white heat, and molten cast iron be poured upon it. Cold blast iron will require less wrought iron than hot blast iron. To give the toughened cast iron closeness and smoothness, alloys of tin, bismuth, zinc, and copper may be added as described alone, or combined with manganese.

An alloy resembling brass is formed by alloying zinc with from 2 to 25 per cent. of iron, and mixing that alloy instead of pure zinc with copper, or the iron may be first alloyed with the copper. The addition of tin will harden the compound. With alloys of zinc and iron, especially where the iron does not exceed 8 to 10 per cent. of the zinc, there may be alloyed from 10 to 15 per cent. of lead. The resulting alloy may be used in many instances instead of gun metal, pot metal, or brass, as for casting patterns. The more infusible metals should be fused first, and the fusible ores added afterwards, the surfaces being protected by charcoal or other suitable substances. Heated moulds should be used where the alloys cool too rapidly. A mode of welding the alloys and metals is also described.

[Printed, 4*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 36.]

A.D. 1846, July 14th.—Nº 11,296.

STEWART, David Yoolow.—"Improvements in moulding "iron and brass." The specification and drawings describe modes of making moulds, and ramming the sand in constructing cylinders and pipes of brass or iron.

[Printed, 7*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 155. Patent Journal, vol. 2, p. 587; Engineers and Architects' Journal, vol. 10, p. 122.]

A.D. 1846, July 20th.—Nº 11,301.

NAPIER, James.—"Improvements in smelting copper ores." Iron an[illegible] [illegible]es are used in smelting copper ores,

and the products are decomposed and disintegrated by the action of water.

The ores which contain less than 20 per cent. of copper, and more than two parts by weight of sulphur to 4 parts by weight of copper, are calcined, and formed into "coarse metal," in the usual way. Ores containing less copper and sulphur than the proportion above given are mixed with other sulphurous ores, so that the whole may contain the required proportions.

Ores which contain by themselves, or by mixture with other ores, more than 20 per cent. of copper, and more sulphur than one part by weight of sulphur to 4 parts by weight of copper, are considered and treated as "coarse metal." To every ton of this ore or metal are added 56 lbs. of soda ash or potash (containing about 50 per cent. of alkali,) and 56 lbs. of slaked lime; the mixture is fused in a fusing or "metal furnace." The slag is skimmed off, and over the surface scrap iron is strewed, 1 cwt. of iron to every ton of "coarse metal." The mixture is, when melted, stirred with a rabble, and then immediately run into moulds. When set the metal is placed in a shallow pit, and covered with water. In two or three hours the mass is partially disintegrated, the water is then run off, and the mass is left moist, and in about 24 hours becomes a powder. It is then calcined, and afterwards sprinkled with water, and then fused in a fusing or metal furnace. 1 cwt. of pulverised anthracite coal, and 10 lbs. of sand (with, if necessary, lime or fluor spar as a flux) are fused with every ton weight of powder. The fused product is run out, and is then fit for the refining process.

[Printed, 3*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 183; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 110; Mechanics' Magazine, vol. 46, p. 200; Patent Journal, vol. 2, p. 594.]

A.D. 1846, July 23.—N° 11,307.

BELL, THOMAS.—"Improvements in the smelting of copper "ores." Anthracite coal, charcoal, or coke is employed, so as to avoid the inconvenience of smoke. A roasting furnace, having three or four floors is used. It is connected by a long flue 150 or 200 feet long, with a roasting kiln, which is 2 or 3 feet square, and 10 or 12 feet high. The gases from the ore in the first furnace (the ore being in small pieces) pass through the larger pieces of ore charged in the "upright furnace," from thence they

pass by a flue about a foot square to the vitriol chamber. Steam under pressure of about 30 lbs. to the square inch is introduced by jets into the flue near the vitriol chamber.

A supply of acid gases obtained from saltpetre or nitrate of soda by the action of sulphuric acid, is introduced in the usual way.

Sulphuric acid is condensed at the bottom of the chamber; the uncondensed gases are collected by passing them through columns of coke.

[Printed, 3*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 168; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 109; Patent Journal, vol. 2, p. 605: Engineers and Architects' Journal, vol. 10, p. 88.]

A.D. 1846, July 30th.—N° 11,317.]

BESSEMER, Henry.—"Improvements in the manufacture of "glass," &c., and silvering glass, and in "the manufacture of "tinfoil, and thin sheets of other metals or alloys of metal." Apparatus for melting and founding glass is described.

Sheets of tinfoil, and other metals and alloys are made in large sizes, by running the molten metal between rollers, and rolling it before it is solidified.

In silvering glass an amalgam composed of an ounce of silver and 3 or 4 lbs. of mercury is used, instead of mercury alone.

[Printed, 5*s*. 3*d*. See Patent Journal, vol. 2, p. 810.]

A.D. 1846, August 4.—N° 11,322.

PAYNE, Thomas.—"Improvements in the manufacture of rolls "for rolling iron and other metals." The rolls are cast hollow, and solid wrought iron or other shafts or axes are accurately fitted therein.

The axes are keyed or fastened by collars, shrunk on them, and have suitable necks turned on their ends.

[Printed, 3*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 174; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 108; Engineers and Architects' Journal, vol. 10, p. 90; Patent Journal, vol. 2 p. 623.]

A.D. 1846, October 15.—N° 11,410.

MUNTZ, George Frederick.—"An improved manufacture of "metal plates for sheathing the bottoms of ships or other vessels." The alloy used by the patentee for sheathing ships, as described

in a former specification (see *ante*, No. 6325, p. 70,) consists of about 60 parts copper and 40 parts of zinc. The proportion of copper may be reduced by combining therewith lead.

The alloy proposed consists of 56 parts copper, 43¼ parts of zinc, and 3¾ parts of lead. The purest metals only should be used. The alloy is cast in ingots, and rolled at a red heat, and annealed, and afterwards cleansed by acid mixtures, in the usual way.

[Printed, 3*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 355; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 268; Mechanics' Magazine, vol. 46, p. 382; Patent Journal, vol. 2, p. 792; Engineers and Architects' Journal, vol. 10, p. 180.]

A.D. 1846, October 29.—N° 11,430.

REID, WILLIAM.—"Improvements in the manufacture of wire." Wire of any required length is made by welding rods "end to end " scarfwise, and passing the united rods through a drawing " machine." The wire, whether of iron or copper, or its alloys, is prepared for being coated with tin, or other metals or alloys, by cleansing its surface by the mechanical friction of suitable apparatus, as described, instead of using acids.

The cleaned wire is wound on reels, and is passed through a box containing sal ammoniac immediately before it is passed into the bath of molten coating metal.

[Printed, 10*d*. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 395; Mechanics' Magazine, vol. 46, p. 432; Patent Journal, vol. 2, p. 838; Engineers and Architects' Journal, vol. 10, p. 180.]

A.D. 1846, November 3.—N° 11,434.

WETTERSTEDT, BARON CHARLES.—"Improvements in the " manufacture of sheet metal for sheathing and other purposes," &c. Lead is alloyed with antimony, 100 parts with 1 or 2 parts of regulus of antimony, and is made into sheets by rolling it. Refined copper is run from the refining furnace, and alloyed with about ½ per cent of regulus of antimony, and mixed with 2 or 3 pounds of hot calcined soda, and rolled into sheets. Sheets suitable for sheathing ships are made by running refined copper from the furnace into a cast-iron mould, and running upon it 4 or 5 times the quantity of Muntz's yellow metal.—(See *ante*, No. 6325, page 70, 60 parts copper and 40 parts zinc.)

The sheets are afterwards rolled.

Molten tin may be in a similar manner run upon lead, and be rolled into sheets.

[Printed, 4d. See Repertory of Arts, vol. 9 (*enlarged series*), p. 357; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 415; Patent Journal, vol. 2, p. 862; Engineers and Architects' Journal, vol. 10, p. 225.]

A.D. 1846, December 12.—N° 11,448.

PIAGET, Louis Hypolite, and BOIS, Philip Henry Du.—" Improvements in producing ornamental metal surfaces." Metallic surfaces are coated by the electro process, or by simple immersion in suitable solutions. A solution of silver is formed by dissolving 700 drams of sulphate of soda in four parts of warm filtered water, and mixing therewith 25 drams of carbonate of soda for the electro process; 75 drams for simple immersion process dissolved in a pint of warm water, and adding thereto " 31 " drams of moist carbonate of silver."

A gilding solution for the electro process is formed by dissolving " 371 drams of pure phosphate of soda in 4½ pints," and " 50 " drams of recently prepared sulphate of soda in half-pint," and " seven drams of dry chloride of gold in half-pint" of warm filtered water. The gold is mixed with the phosphate, and the sulphate is added thereto. For an immersion solution, the chloride of gold is mixed with " 700 drams of pure pyrophosphate of " potash," dissolved in five pints of warm water. The surface is prepared for being coated by putting it in essence of turpentine for quarter of an hour, and washing it then in an acid solution, then again in water, and then in human urine, and then in the metallic solution.

[Printed, 10*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 83; London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 417; Patent Journal, vol. 2, p. 885; Engineers and Architects' Journal, vol. 10, p. 292.]

A.D. 1846, December 7.—N° 11,476.

MOREWOOD, Edmund, and ROGERS, George.—" Im-" provements in the manufacture of iron into sheets, plates, and " other forms, in coating iron, and in preparing iron for coating, " and other purposes." An alloy of 50 parts zinc, and 50 parts tin, is used for coating sheet metal; the alloy combines the tenacity of tin with the protecting quality of zinc. The proportions may be varied by using 25 to 67 parts zinc, with from 75 to 33 parts

tin. The sheets may be coated by simple immersion, or by means of rollers immersed in a bath of molten alloy.

The "zinc result" precipitated to the bottom of baths of molten zinc is melted with chloride of manganese as a flux. An alloy is formed of 50 parts of the zinc, 34 of lead, and 16 of antimony, with chloride of manganese as a flux. If common zinc be used, a sal ammoniac flux is employed.

Sheets of coated metal are passed through rollers immersed in a flux similar to that used in the coating process, and heated to a rather lower degree than the melting heat of the coated metal; instead of the flux, palm or rape oil may be used, where the heat is not too high.

Sheets of metal are coated in a suitable closed vessel, so constructed that "vapour of muriatic acid" is present on the surface of the bath of molten metal, and atmospheric air is excluded. Apparatus for giving corrugated shape to sheet metal, is described.

[Printed, 9*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 169; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 18; Patent Journal, vol. 3 (*conjoined series*), p. 18; Patent Journal, vol. 3. p. 50.]

A.D. 1846, December 14.—N° 11,482.

YATES, James.—"Furnaces." The specification and drawings describe low blast furnaces wherein the heat is reverberated down on the charge which is reduced as quickly as possible.

Two or more reciprocating steam engines are used to work the blowing engine, and maintain an uniform pressure. The pressure of steam or of springs is used in an air regulator for regulating the supply of air.

Two or more fans are used for creating a blast, the air from the first being driven into the case of the second fan.

[Printed, 1*s*. 7*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 129; Mechanics' Magazine, vol. 47, p. 20; Patent Journal, vol. 3, p. 103.]

A.D. 1846, December 31.—No. 11,515.

CHÉNOT, Adrien.—"Improvements in the treatment of me-"tallic oxides and their compounds, and in apparatus for the "same." The specification treats at considerable length of the theory and practice of separating metals from their gangues, or matrices, and distinguishes them in four classes.

1. Fixed or non-volatile metals, less fusible than their gangues.

2, intermediate metals. 3, metals more fusible than their gangues. 4, volatile metals.

The patentee gives full explanations of the theory on which he proceeds, and the processes which he employs, aided by drawings, which should be referred to.

[Printed 1*s*. 1*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 215; Patent Journal, vol. 3, p. 153.]

A.D. 1847, January 19.—N° 11,534.

SHEARS, Daniel Towers.—" Improvements in the treatment " of zinc ores," &c.—(*A communication.*) Roasted zinc ores are mixed with anthracite or other coal or fuels in a high closed furnace, described with the aid of drawings. The furnace is so constructed that gas is produced, which may be used for lighting purposes, at the same time that zinc is produced from the ores.

[Printed, 8*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 88; Patent Journal, vol. 3, p. 190; Engineers and Architects' Journal, vol. 10, p. 294.]

A.D. 1847, October 8.—N° 11,553.

BRAMWELL, Thomas.—" Improvements in furnaces and ap- " paratus to render atmospheric air available in producing cyanides " and certain other compounds," &c. A furnace is described with drawings for manufacturing cyanides, and other purposes, in which heated or burned air is made to enter into a suitable decomposing tube from the furnace through numerous holes made therein, or by preference, long narrow openings. The air is thereby acted upon by a long column of heated carbon.

[Printed, 1*s*. 3*d*. See Repertory of Arts, vol. 9 (*enlarged series*), p. 280; Patent Journal, vol. 3, p. 293.]

A.D. 1847, February 24.—N° 11,591.

NORMANDY, Alphonsé René le Mere de.—" Improve- " ments in the manufacture of zinc." The zinc ores are melted in a blast furnace, which is described with the aid of drawings. It is shaped something like a retort, and is provided with suitable pipes and condensing apparatus.

The oxyde of zinc, and the volatile products are collected by passing the products of combustion through tanks of water provided with partitions, or through boxes filled with coke or charcoal,

which is wetted. The products are recovered by a washing process. The hot blast may be used.

[Printed, 1*s*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 264; Patent Journal, vol. 3, p. 388.]

A.D. 1847, February 24.—N° 11,592.

WALTON, FREDERICK.—" An improved mode of coating or " covering, or of coating, covering, and ornamenting, the surfaces " of articles which are or may be made of wrought iron, or of " other metal or metals." The metallic articles which may be made of iron, brass, or other hard metal which will withstand heat are coated with a vitreous compound combined with red lead and oxide of tin, applied in the form of a paste and fused.

[Printed, 9*d*. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 183; Patent Journal, vol. 3, pp. 364 and 382; Engineers and Architects' Journal, vol. 10, p. 355.]

A.D. 1847, March 2.—N° 11,600.

NAPIER, JAMES.—" Improvements in smelting copper and other " ores." Copper ores are smelted with common salt and lime and carbonaceous matters in suitable proportions, according to the substances combined therewith, as stated. The improvements are based on those described in the specification of former Letters Patent, dated July 20, 1846 (see No. 11,301, page 142). When copper ores contain little or no sulphur, the calcining and disintegrating process may be dispensed with. The various copper ores are mixed so that their earths separate and form glass.

If the ores contain not less than one part of iron and one part of sulphur to two parts of copper, with every ton of ore 56 lbs. of common salt, 40 lbs. of slaked lime, and 100 lbs. of coal, are fused in the "melting furnace." Iron is added, and the product is reduced to powder by the action of water, as described in the specification of the former Patent, No. 11,301 *ante*, page 142. Other proportions are given and may be used according to the quantity of iron or other metal contained in the ores.

[Printed, 3*d*. See Repertory of Arts, vol. 10 (*enlarged series*), p. 310; London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 197; Patent Journal, vol. 3, p. 386; and Engineers and Architects' Journal, vol. 10, p. 357.]

A.D. 1847, March 23.—N° 11,632.

LYONS, MORRIS, and MILLWARD, WILLIAM.—" Certain " improved alloys of metals and improvements in the deposition

" of metals." I. An alloy of copper, platinum, and palladium is formed by fusing for three hours, in a crucible, nine oz. of copper and one oz. of platinum, with borax as a flux; then adding one oz. of palladium, and keeping up the heat, stirring, and adding borax. The proportions of platinum and palladium may be varied, and be made to produce different shades of colour, as required.

II. Solutions suitable for the electro process are formed by adding to the solutions of the metals or salts, or oxides of the metals dissolved in cyanurets of potassium or sodium, compounds of sulphur or carbon, such as bisulphuret of carbon (which is preferred), or chlorides of carbon or sulphur, or hyposulphites of potash or soda, sulphuric or other ethers, and the hydro carbons, separately or combined. Place " six oz. of bisulphuret of carbon " in a stoppered bottle," pour upon it " a gallon of the cyanide " solution, from which the deposit is about to be made"; let it stand for 24 hours, then decant the mixture, and to every 20 gallons of solution about to be acted upon add two oz. of the mixture, and add as much every day when the solution is used.

III. Figured designs, sunk or in relief, are formed on the surfaces of metals and their alloys by coating the metals with a thin coating of protecting metal, as gold, silver, or iron, for copper and its alloys; or gold or silver for zinc, Britannia metal, &c.; gold, silver, or copper for iron or steel. Upon the thin coating figures are drawn in copal or other varnish. The exposed part of the thin coating is removed by dipping the metallic article in a suitable acid mixture; or the operation may be reversed, and the reverse portions of the surface be acted upon, according as a sunk or relief pattern is required.

[Printed, 4*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 113; Patent Journal, vol. 3, p. 482.]

A.D. 1847, March 23.—N° 11,635.

SUSSEX, FRANCOIS STANISLAS MELDON DE.—" Improve- " ments in the smelting of copper and other ores." Instead of melting copper ores with an excess of sulphur, such means or substances are employed " as will cause an entire or complete disul- " phuration;" and when all the sulphur is removed, " the metal is necessarily obtained in a pure state. The ores are pulverized, sifted, and sorted, and are then so mixed that about 50 or 60 per

cent. of silica may be present in the mixture; if silica be present in greater excess, lime, fluor spar, or other earths are added. About five cwt. of powdered ore are mixed with 25 lbs. of finely powdered carbonaceous matter, charcoal, or anthracite coals, free from sulphur, and are exposed for about three or four hours to a low red heat in a reverberatory furnace, so as to expel as much sulphur as possible. The sulphur and acids of sulphur still left are got rid of by lowering the temperature of the furnace, and adding to the mixture four or five per cent. of alumina or magnesia, and one per cent. of nitrate of soda, potash, or lime. The mixture is then exposed to a higher heat than before, and the copper is "wholly brought to the state of oxide." Or the heated charge may be withdrawn from the reverberatory furnace and precipitated into a tank of liquor ammonia or other alkaline solution. In heating chlorides as chloride of siver, 144 parts of the chloride are mixed with about 32 parts of soda or 48 parts of potash, and are heated in a furnace, or silicates of soda or potash may be employed. To increase the fusibility of the slags the silicates are used; or such proportions of alkalie in its caustic or carbonated state may be employed as will produce a soluble slag. Directions are given as to the proportions to be employed in the various processes.

[Printed, 5*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 46; Patent Journal, vol. 3, p. 507.]

A.D. 1847, July 23.—N° 11,811.

PERLBACH, Harry Joseph.—" An improved method or " methods of uniting certain metals and alloys of metal." Wrought iron, or steel, or copper, and its alloys, may be united with cast iron by the following process:—Clean the wrought-iron or steel article with nitric or other acid; heat it, and dip it hot into the acid solution; then wash it and immerse it in an alkaline solution to remove all acid; tin it, and cover the surface intended to be united with cast iron with a layer of alloy or solder (by preference, 5 parts of copper to 95 parts tin). Place the article in a suitable mould, and pour on the prepared surface molten cast iron, which will unite firmly thereto. Copper and its alloys are united to cast iron by filing the surface, covering it with alloy, and adding the iron at a low heat.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 40.]

A.D. 1847, September 2.—N° 11,848.

OXLAND, Robert.—" Improvements in dyeing certain parts of " which improvements are applicable to the manufacture of me- " tallic alloys." Tungstate of soda is used instead of tin in preparing dyeing mixtures. It is prepared from wolfram, the native tungstate of iron and manganese. Wolfram is extracted from tin ores by testing them to ascertain in what quantities it is present, and mixing therewith the necessary proportion of alkali, as soda ash, and putting them in a furnace. Salt cake or sulphate of soda may be used instead of soda ash.

The charge when drawn from the furnace "will consist of " native oxide of tin, the soluble tungstate of soda with the oxides " of tin and manganese, with a small proportion of silica." These are separated by a process of lixiviation. Suitable furnaces and apparatus are described.

Metallic tungsten is obtained from tungstate of soda by digesting it in cold muriatic acid, and removing the acid until all the soda is decomposed, and so obtaining tungstic acid. This is washed and dried, and mixed with coarse oil, tar, or powdered charcoal or coal, and heated in a crucible for about an hour at a strong red heat, which will reduce the tungstic acid to a metallic form; or tungstate of soda may be mixed with charcoal or coal dust, and heated in a crucible. The tungstic acid will be thereby reduced to a metallic form; the soda will be converted into carbonate of soda, which may be separated by lixiviation, leaving metallic tungsten. The solution of carbonate of soda may be evaporated, and the residue again employed as an alkali.

[Printed, 7*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 238; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 192.]

A.D. 1847, September 2.—N° 11,851.

DAVY, Henry.—" Improvements for separating copper and " other metals from their ores." These related to methods of heating the blast employed in smelting operations. Pieces of brick or oxydised copper are introduced into the heating pipes, so as to prevent a large radiating heating surface to the air. Tuyeres may be made of fire clay, lined with platina.

Highly heated air is passed through ores to roast or calcine them.

Smelting furnaces are described with the aid of drawings, having apparatus for introducing air into the furnace, and insuring the proper combustion of the gases and fuel.

In smelting oxides or carbonates of copper, quartz, sand, or the oxides of iron or manganese are added, if those substances are not found to be present in sufficient quantities.

[Printed, 6*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 204; Patent Journal, vol. 4, p. 454.]

A.D. 1847, September 9.—N° 11,858.

ROBERTSON, JOSEPH CLINTON.—"Improvements in the "manufacture of metals from their ores."—(*A communication.*) The roasting ores of iron, lead, zinc, copper, tin, silver, antimony, bismuth, cobalt, or other metals: the ores are placed in a kiln, and while they are exposed to the action of the heat currents of electricity are passed through them. This is effected by means of suitable bars or rods connected with rings or cross bars or by other suitable apparatus.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 201; Mechanics' Magazine, vol. 48, p. 260; Patent Journal, vol. 4, p. 432.]

A.D. 1847, September 9.—N° 11,868.

MORGAN, DAVID, and JENKINS, JOHN BORLASE.—"Certain improvements in the manufacture of copper and other "metal cylinders or rollers for the printing of silks and other "fabrics, and for other similar purposes, and in casting copper "and other metal cylinders, tubes, or rollers, hollow and free "from air bubbles."

[No Specification enrolled.]

A.D. 1847, September 23.—N° 11,872.

JOHNSON, ARTHUR HARRY.—"Improvements in refining "silver lead by effecting a saving in one of the materials used." The "phosphate of lime or bone ash, whereof the cupel or test is "composed, which is used by refiners of silver lead," is recovered and made fit for being again used. This is effected by pulverising the cupel, and adding thereto a sufficient quantity of pyroligneous or acetic acid (of sp. gr. 1·030 to 1·048) to "reduce it to a thin

" consistence." The mixture is stirred and left to settle; in about two days the bulk of the lead is dissolved. The liquor is drained off, and the residuum bone ash containing silver and very little lead is strained, washed, and dried, and may be again used. Lead is recovered by evaporation. Instead of pyroligneous acid, a solution of caustic, potash, or soda, containing about 20 per cent. of pure alkali, may be used.

[Printed, 3*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 295; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 196; Patent Journal, vol. 4, p. 457; Engineers and Architects' Journal, vol. 11, p. 143.]

A.D. 1847, September 30.—N° 11,878.

SALZEDE, Charles de la.—" Improvements in brassing and " bronzing the surfaces of steel, iron, zinc, lead, and tin." Articles are coated with brass by the electro process. A suitable bath is formed by mixing in 5,000 parts of distilled water 610 parts of subcarbonate of potash, 25 parts of chloride of copper, sulphate of zinc 48 parts, azotate of ammonia 305 parts, cyanide of potassium 12 parts. The cyanide of potassium is dissolved apart in about 120 parts of cold distilled water. In the remaining 4,880 parts of water the potash, copper, and zinc are mixed first, at a temperature of about 144° to 172° F.; the solution is cooled, and the ammonia is added.

A bronze solution is made by using 25 parts of chloride of tin, instead of 48 parts of sulphate of zinc, and increasing the quantity of chloride of copper to 48 parts.

[Printed, 5*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 293; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 260; Patent Journal, vol. 4, p. 505; Engineers and Architects' Journal, vol 11, p. 169.]

A.D. 1847, October 14.—N° 11,910.

WALL, Arthur.—" A new or improved apparatus for, and " method of, separating oxides from their compounds and each " other." The specification and drawings describe apparatus for separating iron from copper or other ores. The ores are ground and passed down an inclined plane or on an endless band. They are thereby brought into contact with magnets, so arranged as to attract and separate the particles of iron.

[Printed, 9*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 32; Patent Journal, vol. 4, p. 528; Engineers and Architects' Journal, vol. 11, p. 144.]

A.D. 1847, November 4.—N° 11,939.

LOW, Charles.—" Improvements in the manufacture of [zinc] " copper [tin and other metals]." A mixture or combination, consisting of black oxide of manganese 42 parts, plumbago 8 parts, nitrate of potash or soda or lime 2 parts,—carbon, anthracite, or wood charcoal, 14 parts, is used in smelting copper ores.

The ores are melted in the usual furnace; when first melted about 25 lbs. of the mixture are thrown in, and cause the slag to rise freely mixed with very little copper; the slag is then skimmed or drawn off, and another charge of mixture is added, and more slag is removed, until the copper is left in a very pure state. The parts of the title referring to other metals besides copper were disclaimed.

[Printed, 4*d*. See Repertory of Arts, vol. 13 (*enlarged series*), p. 35; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 419; Mechanics' Magazine, vol. 49, p. 35; Patent Journal, vol. 5, p. 20; Engineers and Architects' Journal, vol. 11, p. 214.]

A.D. 1847, November 4.—N° 11,943.

MOTAY, Cyprien Marie Tessié Du.—" Improvements in " inlaying and coating metals with various substances." These relate to the process of inlaying metallic surfaces known in France as " Damasquinerie." Metals or their alloys are deposited upon metallic surfaces in pattern by immersion or by the electro process. The processes are described under 15 heads, and consist in applying protecting varnishes or coatings to certain parts of metallic surfaces, and operating upon the exposed parts, either by depositing a metallic coating thereon or by removing the metallic surface by means of suitable acids or mixtures.

[Printed, 5*d*. See Repertory of Arts, vol. 12 (*enlarged series*), pp. 53, 135; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 359; Engineers' and Architects' Journal, vol. 11, p. 217.]

A.D. 1847, November 16.—N° 11,966.

BIRKMYRE, William.—" Improvements in smelting copper " and other ores." The ores of copper or other metals which contain sulphur or arsenic, or other substances readily volatilised, are roasted or calcined in a tray or other open vessel in a mundic or iron pyrites kiln. Suitable apparatus is employed for collecting

and condensing the volatilised products in a vitriol chamber, as described.

[Printed, 4*d*. See Repertory of Arts, vol. 11 (*enlarged series*), p. 353; Mechanics' Magazine, vol. 48, p. 500; Patent Journal, vol. 5, p. 27; Engineers and Architects' Journal, vol. 11, p. 215.]

A.D. 1847, November 16.—N° 11,967.

BRUNTON, WILLIAM, junior.—" Certain apparatus for dressing " ores or minerals." Apparatus for washing ores is described with drawings. The water is forced up from below by impulses; it passes up at intervals through the ores, which are placed in suitable vessels with sieve or perforated bottoms. The waste is discharged over the magin of the sieves by means of "a skimmer " pipe and stream of water." An uniform feeding apparatus is employed.

[Printed, 10*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 45; London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 427; Patent Journal, vol. 5, p. 21; Engineers and Architects' Journal, vol. 11, p. 214.]

A.D. 1847, November 18.—N° 11,969.

MOREAU, PIERRE ARMAND, le Comte de FONTAINE.— " Improvements in the process and machinery for making, uniting, " and preserving metallic and non-metallic pipes."—(*A communication.*) Machinery is described with drawings for piercing and rivetting sheets of hard or soft metals, or leather, to form pipes.

Iron pipes are preserved from oxydation by putting them "in " an electro negative state by the process which Davy discovered " and employed to preserve the copper sheathing on ships' bot- " toms." Strips or rings of zinc are attached to the surface of the iron.

Iron pipes may be lined with zinc, lead, or pewter.

[Printed, 1*s*. 9*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 162; Patent Journal, vol. 5, p. 79.]

A.D. 1847, November 18.—N° 11,971.

PARKES, ALEXANDER.—" Improvements in the manufacture of " metals, and in coating iron and steel." Lead, copper, silver, gold, iron, manganese, coating iron with copper. In manufacturing lead from ores, as sulphuret of lead (galena), a flux is

employed in proportion of about 200 lbs. to the ton of ore, being composed of muriate of lime or baryta 500 parts, by weight; carbon (charcoal, coal, or anthracite, 100 parts; metallic iron, 25 parts. These are mixed with the ores, which should be roasted and fused in a furnace. The flux will float at the top, and the ore in from 3 to 5 hours may be tapped from below. Other fluxes composed of acid, alkaline, or earthy matters may be used. Again, sulphuret ores of lead may be fused with 10 per cent. of alkaline or other salt, by preference muriate of soda, 10 per cent. of iron, and 5 per cent. of carbon, in a furnace. The fused products run into a mould, to which water is added when it is set, so as to form it into a powder, this is calcined at a low heat, to drive off all sulphur, and very pure lead may be then obtained from it.

In manufacturing copper from ores, such as carbonate or oxide ores, containing little sulphur, the ores are mixed according to the earthy compounds they contain, so as produce a fusible slag. With these is mixed a flux composed of muriatic acid 100 parts, by weight, water 200 parts, carbon 200 parts, caustic lime or baryta 400 parts; to every ton of copper ore containing 18 to 30 per cent. of copper or less, about 3 cwt. of flux may be added; if the per centage of copper be increased, that of carbon in the flux should also be increased. The mixture is fused in a furnace, and is tapped in 5 or 6 hours. Nitric, boracic, or hydrofluoric acid, may be employed, if their cost will admit of it. In like manner chloride or oxide of silver may be treated. Sulphuret or arsenuret ores of copper should be pulverised, then calcined, to drive off sulphur, and they may then be treated like carbonates or oxides; or by preference a chloride salt, such as chlorides of calcium, barium, may be used, or soda, or an acid as muriatic is added to the ores at the end of the calcining process. Or the ground ores, when calcined, may be smelted with acids, or alkaline or earthy salts, and carbon, by preference 1 cwt. of muriate of lime should be used with 2 cwt. of carbon to a ton of ore.

In extracting gold and silver from sulphuret ores of those metals, a similar process may be followed.

In refining copper a metallic, or alkaline, or earthy salt is added as a flux; as 5 lbs. of nitrate, muriate, or cyanide of potash or soda to a ton of copper.

In making iron similar fluxes are employed.

In the manufacture of manganese a flux composed of muriatic

acid, 100 parts by weight; water, 200 parts; charcoal, 200 parts; caustic, lime, baryta, or magnesian limestone, 400 parts.

In coating steel or iron with copper, or its alloys, melt the latter, add common salt to form a thick flux on the surface, and dip cleansed steel or iron therein.

[Printed, 4*d*. See Repertory of Arts, vol. 12 (*enlarged series*), p. 191.]

A.D. 1847, December 22.—N° 12,001.

ROCHAZ, Charles André Felix.—" Improvements in treat- " ing zinc ores, and in manufacturing oxide of zinc." The specification and drawings describe a furnace for reducing zinc ores, and producing metallic zinc without the use of retorts. The vapours are collected and condensed by means of suitable apparatus, and receivers situated over the mouth of the furnace.

Oxide of zinc is produced by distilling the metal or matters containing it, in subliming pots or vessels having perforated covers, through which the volatilized metal issues into an oxydising chamber; it is there brought into contact with the oxygen of the atmosphere, and is converted into oxide of zinc.

[Printed, 1*s*. 3*d*. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 97; Mechanics' Magazine, vol. 49, p. 286; Patent Journal, vol. 5, p. 303; Engineers and Architects' Journal, vol. 11, pp. 307, 343.]

A.D. 1848, March 22.—N° 12,102.

HENDERSON, William.—" Improvements in breaking lead " and other ores."

[No Specification enrolled.]

A.D. 1848, April 27.—N° 12,142.

PARKES, Alexander.—" Improvements in the manufacture of " metals, and in coating metals." Sulphuret ores of copper are melted with sulphate of lime, or sodo, or baryta, or potash, 100 to 150 lbs. to the ton of ore. To produce a regulus, which is more than ordinarily rich in metal, carbonate or oxide ores may be added to make the regulus rich in metal. Sulphuret ores of silver and antimony may be similarly treated; from 5 to 10 per cent. of scrap iron should be added to the silver ores. The metal is obtained from the regulus so obtained, or from other sulphurets,

by one operation or melting, by mixing therewith a metallic compound of such a character "that the oxygen therein contained " shall desulphurize the sulphuret in the act of melting, and " allow the metal to separate."

Carbonate or oxide of copper may be used, or carbonate or oxide of zinc, in which case "a great part of the zinc will form " an alloy with the copper." Other oxydised compounds may be used. An alloy, consisting of 9 parts of lead, and 3 parts of antimony or 9 parts lead, 1 tin, and 1 antimony, may be used for coating iron and steel; chloride of barium, or sodium, or both, may be used as a protecting flux for covering the melted alloy, nto which the iron or steel is dipped.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 332; Repertory of Arts, vol. 14 (*enlarged series*), p. 19; Artizan, vol. 7, p. 105; Patent Journal, vol. 6, p. 87.]

A.D. 1848, May 18.—N° 12,158.

TAYLOR, WILLIAM.—" Forming metals, or mixtures of metals, " by aid of machinery, into the form of tubes." The specification and drawings describe machinery for turning up or bending flat plates of malleable metals or alloys, such as rolled iron, or copper, brass, zinc, or lead, or their alloys. The edges of the bent up plates are joined so as to form tubes, by welding or brazing, or drawing them in a draw bench.

[Printed, 1*s*. 8*d*. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 22; Mechanics' Magazine, vol. 49, p. 525; Practical Mechanics' Journal, vol. 1, p. 226; Artizan, vol. 7, p. 83; Patent Journal, vol. 6, p. 74; and Engineers and Architects' Journal, vol. 12, p. 22.]

A.D. 1848, May 26.—N° 12,162.

PENNY, JAMES PARKER.—" Improvements in obtaining copper from copper ores."—(*A communication.*) Leaves, chips of wood, and other carbonaceous matters, are mixed with carbonates and oxides of copper, in the smelting process, whereby they are decomposed at one operation. The carbonates or oxides are smelted in a furnace of the usual construction, save that the crown is low, and the fire place is deep. The ore is broken small, and is introduced when the furnace is at a white heat; when it is melted the leaves, chips, or other carbonaceous matters, are mixed up with

the fused mass, and effect the decomposition of the ores. The copper is tapped and run into moulds in the usual way.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 10; Mechanics' Magazine, vol. 49, p. 549; Practical Mechanics' Journal, vol. 1, p. 227; Artizan, vol. 7, p. 105; and Patent Journal, vol. 6, p. 87.]

A.D. 1848, June 13.—N° 12,184.

CAPPER, CHARLES HENRY.—"A method of preparing and "cleansing minerals and other substances." Crushing and washing or jigging apparatus is described with drawings. Perforated cylinders or sieves are used for sifting and sorting the broken ores. Suitable reciprocating and rotating vessels connected with supply and escape tubes and troughs are described.

[Printed, 10*d*. See Mechanics' Magazine, vol. 49, p. 596; Practical Mechanics' Journal, vol. 1, p. 229; Artizan, vol. 7, p. 106; and Patent Journal, vol. 6, p. 106.]

A.D. 1848, June 13.—N° 12,186.

HUNT, WILLIAM. — "Improved apparatus to be used in "processes connected with the manufacture of certain metals "and salts." A reverberatory furnace for melting metals is described with the aid of drawings. It is so constructed that coal of ordinary quality may be used therein. The coal is heated and partially carbonised on a bed or floor, from which it is directly transferred to the grate or fire-place."

[Printed, 9*d*. See Mechanics' Magazine, vol. 49, p. 599; Practical Mechanics' Journal, vol. 1, p. 252; Artizan, vol. 7, p. 106.]

A.D. 1848, June 24.—N° 12,193.

HUNT, WILLIAM.—"Improvements in obtaining certain metals "from certain compounds containing these metals," &c. These relate first to modes of recovering iron from iron slag and copper, and tin from copper slag.

The iron slag is run into water and granulated, and then cemented with carbonaceous matters, and melted in a blast furnace. Copper slag is run from the copper ores when calcined, in such a state as to contain about 60 per cent. of copper, it is granulated in water. The granulated slag is mixed with sulphurizing or deoxydising compounds, such as sulphurous copper

ores, slaked lime, and coal dust. With a ton of slag ores containing about 30lbs. of sulphur, may be used with 40lbs. of slaked lime and 20lbs of coal dust. The mixture is melted in a reverberatory furnace having two working beds. The charge is prepared by being heated on the bed more remote from the fire, and afterwards transferred to the bed nearer to the fire. ½ cwt. of coal dust alone or mixed with 1 cwt. of slaked lime may be used with a ton of granulated or crushed copper slags.

[Printed, 1s. 6d. See Repertory of Arts, vol. 13 (*enlarged series*), p. 150; Mechanics' Magazine, vol. 49, p. 646; Practical Mechanics' Journal, vol. 1; p. 253; Artizan, vol. 7, p. 130; Patent Journal, vol. 6, p. 124; Engineers and Architects' Journal, vol. 12, p. 56.]

A.D. 1848, August 21.—N° 12,246.

RICHARDSON, Thomas.—" Improvements in the condensation " of metallic fumes, and in the manufacture of white lead." Ordinary " tea lead " is melted, and the tin and oxide of lead that rises to the surface are skimmed off, the residuum is very pure lead, it is granulated or otherwise finely divided state, and is made into white lead. The lead is moistened with acetic, nitric, or other suitable acid mixture, and steam or hot air and carbonic acid are forced into connection with the moistened lead in suitable closed vessels. Metallic fumes are condensed by forcing pieces of coke, or broken brick, and admitting jets of steam in a suitable tower or shaft.

[Printed, 7d. See Repertory of Arts, vol. 13 (*enlarged series*), p. 283; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 193; Mechanics' Magazine, vol. 50, p. 139; Artizan, vol. 7, p. 183; Patent Journal, vol 6. p. 216; Engineers and Architects' Journal, vol. 12, p. 115.]

A.D. 1848, August 22.—N° 12,252.

PATTINSON, Hugh Lee.—" Improvements in manufacturing " a certain compound or certain compounds of lead, and the " application of this and certain other compounds of lead to " various useful purposes."

[No Specification enrolled.]

A.D. 1848, August 28.—N° 12,256.

YOUNG, William, and YOUNG, Henry Burgess.—" Im" provements in smelting and refining lead ore." The fumes and

other products given off from lead in the various operations are forced into a closed chamber, the bottom of which is covered with water. The air in the chamber is exhausted and the fumes and gases are forced through the water in which are fixed sieves or perforated metal plates, which arrest and collect the particles which are condensed. The steam generated by the presence of the hot fumes or particles on the surface of the water passes off through suitable flues, chambers, and perforated plates.

[Printed, 7*d*. See Repertory of Arts, vol. 13 (*enlarged series*), p. 298; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 156; Mechanics' Magazine, vol. 50, p. 211; Artisan, vol. 7, p. 184; Patent Journal, vol. 6, p. 215; Engineers and Architects' Journal, vol. 12, p. 119.]

A.D. 1848, September 14.—N° 12,268.

WINFIELD, Robert Walter, and WARD, John.—"Improvements in the manufacture of tubes and in the manufacture "of certain articles made in part of tubes." Machinery for manufacturing taper or other tubes of soft metal are described with drawings. They are drawn through a metallic ring of some soft metal as tin, which is enlarged in the process, and acts as an expanding draw plate. Tubes are made double, one being put inside the other and drawn, these form gas-tight tubes.

[Printed, 6*d*. See London Journal (*Newton's*), vol. 34, (*conjoined series*), p. 181; Mechanics' Magazine, vol. 50, p. 260; Artizan, vol. 7, p. 208; Patent Journal, vol. 6, p. 235; Engineers and Architects' Journal, vol. 12, p. 112.]

A.D. 1848, October 12.—N° 12,288.

STIRLING, John Davie Morries.—"Improvements in the "manufacture of iron and metallic compounds." Various mixtures of metals producing different qualities of iron are described. (See Abridgments of Specifications relating to Iron and Steel, p. 93.)

An alloy resembling gold is formed by alloying zinc with about 7 per cent. of iron, and adding thereto an alloy of copper 200 parts, manganese 1 to 4 parts; 4 parts of the alloy of copper and manganese added to 1 of the zinc and iron alloy produce a metal resembling gold in its appearance, and called "British gold."

The manganese may be added as a black oxide to the copper when in a melted state, the surface being covered with a suitable flux, or the copper and manganese are melted together in a crucible.

The addition of small proportions of tin as $\frac{1}{200}$th, to 4 per cent.

increases the hardness of the alloy, and diminishes the tendency in rubbing surfaces "to heat." Bismuth may be used instead of tin. An alloy resembling silver is formed by mixing 10 to 6 parts of copper, 2 parts of nickel, 6 to 4 parts of the zinc and iron alloy above mentioned. This alloy will roll well; the nickel and copper should be first melted, and the zinc and iron added with a suitable covering flux.

[Printed, 5*d*. See Repertory of Arts, vol. 16 (*enlarged series*), p. 42; Mechanics' Magazine, vol. 50, p. 381, and vol. 55. p. 72; Practical Mechanics' Journal, vol. 3, pp. 94, 97, and 154; Artizan, vol. 7, p. 231; Patent Journal, vol. 7, p. 12; Engineers and Architects' Journal, vol. 12, p. 151.]

A.D. 1848, November 9.—N° 12,322.

NAPIER, James.—"Improvements in the manufacture of copper "and other metals and alloys of metals."

[No Specification enrolled.]

A.D. 1848, November 11.—N° 12,325.

PARKES, Alexander, and PARKES, Henry.—"Improve- "ments in the manufacture of metals and alloys of metal," &c. Carbonates or oxidised compounds are calcined like sulphuret ores of copper to expel impurities, alone or in combination with an acid or alkaline substance or sulphuret of iron. Muriate of ammonia may be used in the process to expel arsenic or antimony, using a proportion equal to that of the arsenic or antimony as found by analysis. Chlorides of barium or calcium may be used. The calcined carbonates or oxidised compounds are converted into sulphurets in order to separate more readily the earthy matters, which is done by heating them with sulphur or compounds of sulphur in a furnace in the various proportions specified. Currents of air or steam may be injected into or upon the surface of the melted mass. The carbonates or oxides may be fused with sulphurets in a reverberatory furnace with suitable fluxes. They may also be reduced by melting them with "stearates or oleates," as of lime, baryta or soda, gums, resins, and fatty matters in the proportion of 10 or 15 per cent. of the copper found by analysis in the compound; metallic iron may also be used therewith, alone or with an acid, or alkali or suitable fluxes as specified.

Oxidised compounds of zinc may be treated with the carbonates and oxides of copper to obtain an alloy which should consist of

about 100 parts copper to 75 parts of zinc. The mixture should be fused with suitable fluxes, as "chloride salts," for about 5 hours. Phosphorus is combined with copper, zinc, tin, and lead, and their alloys, in proportions of from 1 to 5 per cent. thereof, by fusing the metals or alloys and introducing the phosphorus by degrees. Eight different combinations are given, the alloy is stated to be suitable for sheathing printing rollers, boilers, tubes, &c., being fusible when hot and solid and compact when cold.

[Printed, 4d. See Repertory of Arts, vol. 14 (*enlarged series*), p. 96; Mechanics' Magazine, vol. 50, p. 476; Practical Mechanics' Journal, vol. 2, p. 60; Patent Journal, vol. 9, p. 46.]

A.D. 1848, December 4.—N° 12,358.

DRAYTON, THOMAS.—"Improvements in silvering glass and other surfaces." 2 ounces of nitrate of silver, an ounce of hartshorn or ammonia, 3 oz. of water and 3 of spirits of wine are mixed, allowed to stand for a few hours and filtered. To an ounce of the filtered fluid add ¼ oz. of saccharine matter, as grape sugar, dissolved in equal parts, ½ pint of each, of spirit and water. The glass or other surface is cleaned and heated to about 160° F., the silver mixture is poured thereon, and dried, and varnished. The solution "will deposit silver upon metals in a very perfect "manner."

[Printed, 3d. See Repertory of Arts, vol. 14 (*enlarged series*), p. 38; London Journal (*Newton's*), vol. 34 (*conjoined series*), p. 414; Mechanics' Magazine, vol. 50, p. 543; Patent Journal, vol. 7, p. 118; Engineers and Architects' Journal, vol. 12, p. 251.]

A.D. 1848, December 28.—N° 12,389.

LOW, CHARLES.—"Improvements in smelting copper ore." Furnaces for smelting copper are so constructed "that currents "of air may be introduced above the melted metal, and yet below "the flame, and heated products at the upper part of the "furnace."

The object is effected by making suitable openings in or near the bridge, or in the sides of the furnace.

[Printed, 3d. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 39; Mechanics' Magazine, vol. 51, p. 16.]

A.D. 1848, December 28.—N° 12,393.

MITCHELL, JOHN, ALDERSON, HENRY, and WARRINER, THOMAS.—"Improvements in smelting copper." The sulphur

and iron, which are combined with copper ores, are removed by two distinct operations. The sulphur is entirely removed "by "treating a rich ore, or regulus (obtained without the addition "of iron or alkali) in a finely divided state."

The iron is separated, and the copper obtained "in a com- "paratively pure state by treating the mixed oxides resulting "from the first operation with siliceous and carbonaceous "matters without the use of iron or the application of electric "currents."

[Printed, 4*d*. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 170; Mechanics' Magazine, vol. 51, p. 19; Patent Journal, vol. 7 p. 173.]

A.D. 1849, January 13.—N° 12,415.

BETTS, William.—"A new manufacture of capsules, and of "a material to be employed therein, and for other purposes." The material to be employed is sheet lead coated with sheet tin. The lead and tin are both cast in ingots, and rolled into sheets of the requisite thickness. The thickness of the sheets of tin is about $\frac{1}{20}$th of that of the lead. The sheet tin is then accurately laid on the sheet lead, and two are rolled together and united by pressure.

The compound sheets are made into capsules.

[Printed, 4*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 101; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 40; Mechanics' Magazine, vol. 51, p. 66; Patent Journal, vol. 7, p. 181.]

(This Patent was the subject of litigation in the recent trial of Betts *v.* Menzies. The Court of Queen's Bench held, May 30, 1859, that the process of William Betts, as described, was similar to that of Thomas Dobbs. See *ante*, No. 2761, p. 38, also No. 4515, p. 54.)

A.D. 1849, January 23.—N° 12,437.

PARIS, Charles Henry.—"Improvements in preventing the "oxidation of iron."—(*A communication.*) The iron is first cleansed by using the usual acid mixtures. A vitreous compound consisting of powdered glass 130 parts, carbonate of soda 20½ parts, and boracic acid 12 parts, is then placed on the surface of the iron, and fused thereon, so as to form a protecting coat.

[Printed, 3*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 149; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 39; Mechanics' Magazine, vol. 51, p. 94; Patent Journal, vol. 7, p. 214.]

A.D. 1849, February 14.—N° 12,479.

PATTINSON, Hugh Lee.—"Improvements in manufacturing "a certain compound or certain compounds of lead, and the

" application of a certain compound or certain compounds of " lead to various useful purposes." When half an equivalent or thereabouts of lime, soda, potash, or ammonia, or barytes, is added to an equivalent of chloride of lead, "the whole of the " lead is precipitated as a definite compound, of one atom of " chloride and one atom of hydrated oxide of lead." The oxichloride of lead so precipitated is of a brilliant white colour, and may be used instead of white lead.

[Printed, 4*d*. See Repertory of Arts, vol. 14 (*enlarged series*), p. 150; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 114; Mechanics' Magazine, vol. 51, p. 163; Patent Journal, vol. 8, p. 131; Engineers and Architects' Journal, vol. 12, p. 301.]

A.D. 1849, February 28.—N° 12,497.

ROWLANDSON, THOMAS.—" Improvements in the treatment " of certain mineral waters to obtain products therefrom, and in " obtaining certain metals from certain compounds containing those " metals." Copper is precipitated as a sulphuret from mineral or other solutions thereof, by adding thereto a solution of an alkaline sulphuret, such as by preference sulphuret of sodium. Hydrosulphuret of lime, and protosulphuret of iron may be used for precipitating copper.

Zinc is separated from ores containing zinc with lead, copper, silver, or gold, by pulverising and roasting the ore. Sulphuret of zinc is oxidised, and converted partly into sulphate and partly into oxide of zinc.

The sulphate is removed by water, and the uncombined oxide is dissolved by sulphuric or muriatic acid.

When the zinc is separated the remaining ores are smelted in the usual way without difficulty.

Stannate of soda and stannate of potash are obtained by heating ores or salts of tin with carbonate of soda or potash.

Sulphate of soda is obtained by heating in a furnace common salt and bisulphuret of iron or other compounds of iron.

[Printed, 3*d*. See Repertory of Arts, vol. 14 (*enlarged series*), p. 228; Mechanics' Magazine, vol. 51, p. 212; Patent Journal, vol. 7, p. 238.]

A.D. 1849, February 28.—N° 12,498.

ROCHAZ, CHARLES ANDRE FELIX.—" Improvements in the " manufacture of oxide of zinc," &c. Furnaces are described with drawings for melting zinc ores and obtaining zinc white;

also apparatus for manufacturing oxide of zinc from metallic zinc, by heating it in crucibles and oxidising the vapours thereof.

[Printed, 1*s*. 5*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 83; London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 1; Mechanics' Magazine, vol. 51, p. 213; Patent Journal, vol. 7, p. 260.]

A.D. 1849, March 14.—N° 12,521.

THOMSON, Francis Hay.—"Improvements in smelting "copper [or other] ores." Whinstones and iron slag, trap syenite, bassalt, and other fusible silicates are used as cheap fluxes in smelting copper ores.

With a ton of ore containing about 20 per cent. of copper, 4 cwt. of whinstones, and 70 lbs. of pulverised coke or 2 cwt. of whinstones, and 37 lbs of barilla may be melted.

The words or other contained in the title were disclaimed.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 182; Mechanics' Magazine, vol. 51, p. [illegible]; Practical Mechanics' Journal, vol. 2, p. 157, for disclaimer; Patent Journal, vol. 8, p. 4.]

A.D. 1849, March 14.—N° 12,523.

MOREAU, Peter Armand le Comte de Fontaine.—"Improvements in coating or covering metallic and non-metallic "bodies."—(*A communication.*) These relate to solutions for coating surfaces with metals and their alloys.

For a gilding solution, a solution of neutral chloride of gold is mixed with a solution of "Gayac pitch." A precipitate is sent down, which is dissolved in 100 parts of hot water and 10 of caustic potash, or its equivalent of caustic soda. Twelve other solutions are given for depositing gold, and silver, and platinum, and copper, and brass, and zinc, and tin, and their alloys, either by electro process or simple immersion.

[Printed, 4*d*. See Mechanics' Magazine, vol. 51, p. 284 Patent Journal, vol. 9, p. 55.]

A.D. 1849, March 19.—N° 12,526.

RUSSELL, Thomas Henry, and WOOLRICH, John Stephen.—"Improvements in coating iron and certain other "metals and alloys of metals." The specification describes modes of coating iron with cadmium and its alloys. This is

done by dissolving cadmium in nitric acid, precipitating it by carbonate of soda, and forming a solution with cyanide of potassium for a bath, and employing the electro process. Or 460 parts of cadmium may be alloyed with 200 of tin or 150 parts of zinc. The alloy is melted, its surface being protected with a covering of fat, and iron or other articles may be coated therewith by dipping them. Copper may be deposited with its alloys by the following process:—Take 10 lbs. of acetate of copper, one lb. of acetate of zinc, 10 lbs. of acetate of potash, five lbs. of benzoate of potash; dissolve these in hot water, and add as much cyanide of potassium as will cause precipitation, and $\frac{1}{10}$ more that it may be in excess. The solution may be used as a bath in the electro process.

[Printed, 4*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 163; Mechanics' Magazine, vol. 51, p. 285; Patent Journal, vol. 9, p. 70.]

A.D. 1849, March 26.—N° 12,534.

PARKES, ALEXANDER.—"Improvements in the deposition and "manufacture of certain metals and alloys of metals, and im"proved modes of treating and working certain metals and alloys "of metals, and in the application of the same to various useful "purposes." Iron in the forms of tubes, sheets, or other articles may be coated with two or more of the following metals:—silver, copper, tin, bismuth, and lead, in successive and separate layers, to form protecting coatings. The electro process is used. In refining copper, currents of air or chlorine or hydro carbon gases may be forced by suitable blowing machines upon the surface of the melted metal in the refinery furnace; also, on sulphuretted compounds of copper in the blast furnace. From one half to three per cent. of phosphorous may be added to toughen the copper. It may also be combined with iron, silver, nickels, or their alloys, and be so used for coating iron.

A coating of one or other of these alloys may be cast on copper rollers when worn, to renew their surface, which then is turned to the proper size.

Copper and its alloys may be combined with molybdenum, chromium, tungsten, or manganese, which, in the state of oxides or acids, are with suitable fluxes fused in a crucible. Phosphorus may be combined therewith. Printing rollers may be made of

iron, brass, or white metal, and be coated with copper by the electro process.

[Printed, 6*d*. See Repertory of Arts, vol. 14 (*enlarged series*), p. 361; Mechanics' Magazine, vol. 51, p. 309; Patent Journal, vol. 8, p. 42.]

A.D. 1849, March 26.—N° 12,537.

HENDERSON, DAVID.—" Improvements in the manufacture " of metal castings." Moulds suitable for casting in various metals articles having uniform sections, such as pipes, basins, &c., are described with drawings. A "short part pattern guided by " the mould box, or by a guide attached thereto," is moved gradually along during the process of ramming or filling the mould box.

[Printed, 1*s*. 3*d*. See Mechanics' Magazine, vol. 51, p. 308; Practical Mechanics' Journal, vol. 2, p. 185; Engineers and Architects' Journal, vol. 12 p. 335; Patent Journal, vol. 7, p. 262.]

A.D. 1849, April 2.—N° 12,557.

NEWTON, ALFRED VINCENT.—" Improvements in separating " and assorting solid materials or substances of different specific " gravities."—(*A communication.*) Copper or other ores are ground by passing them through rollers. The powdered ores are then subjected to the action of currents of air or water, and are separated and sorted according to their respective specific gravities, by means of rotating screens and other apparatus, which is described with drawings.

[Printed, 2*s*. 5*d*. See Mechanics' Magazine, vol. 51, p. 332; Patent Journal, vol. 8, p. 164.]

A.D. 1849, May 29.—N° 12,624.

SMITH, DAVID.—" Certain new and useful improvements in " the means of manufacturing certain articles in lead." Leaden shot are made by dropping them in suitable closed vessels, through an ascending current of air, which is to be made to travel at such a velocity that the dropped metal may "come in contact with as " great a volume of air in a shot tower as it would meet in falling" through the common high towers.

[Printed, 5½*d*. See Mechanics' Magazine, vol. 51, p. 545; Patent Journal, vol. 8, p. 117.]

A.D. 1849, July 4.—N° 12,684.

GRANTHAM, JOHN.—" Improvements in sheathing ships and " vessels'" Iron ships are sheathed with copper or other sheathing, by first applying to the iron sides and bottom of the ship a coating of gutta percha or other suitable non-conductor. Wooden ribs may be attached to the ship to afford fastenings for the sheathing. Portable apparatus is used for applying a hot air blast in attaching the sheathing.

[Printed, 9d. See Repertory of Arts, vol. 15 (*enlarged series*), p. 148; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 94; Mechanics' Magazine, vol. 52, p. 36; Artizan, vol. 8, p. 56; Patent Journal, vol. 8, p. 199.]

A.D. 1849, August 1.—N° 12,726.

YULE, ADAM, and CHANTER, JOHN.—" Improvements in the " preparation of materials for coating ships and other vessels." Copper, "yellow metal," or other sheathing is coated with a mixture of carbonate of iron or of plumbago and tar, or bullock's gall, and other matters to protect it from marine deposits. For coating iron or zinc a coating of gutta percha or india rubber is used.

[Printed, 3d. See Repertory of Arts, vol. 17 (*enlarged series*), p. 169; London Journal (*Newton's*), vol. 36, (*conjoined series*), p. 386; Mechanics' Magazine, vol. 52, p. 113; Patent Journal, vol. 8, p. 224.]

A.D. 1849, August 16.—N° 12,744.

YOUNG, JAMES.—" Improvements in the treatment of certain " ores and other matters containing metals, and in obtaining " products therefrom." Tin ore or black tin is heated with sulphuret of sodium or potassium, and stannate of soda or potash may be obtained.

Lead is obtained from native carbonate of lead, or from galena or lead slags, by melting the ores with oxide of iron and small coals.

A compound of lead and antimony is obtained by smelting the slags containing the metals with oxide of iron and small coals.

[Printed, 5d. See Mechanics' Magazine, vol. 52, p. 158; Patent Journal, vol. 9, p. 33.]

A.D. 1849, September 27.—N° 12,789.

BROWNE, William, and VEALE, Richard Rowe.—"Im-" provements in preparing for pulverization ores, &c. Ores and other similar hard substances that are required to be pulverised are to be subjected to a high heat, so as not to fuse them, and are then suddenly cooled with water to disintegrate them.

[Printed, 3*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 290; London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 304; Mechanics' Magazine, vol. 52, p. 279; Patent Journal, vol. 9, p. 4.]

A.D. 1849, October 12.—N° 12,812.

BANISTER, James.—"Improvements in tubes for locomotive " and other boilers." Tubes of copper or its alloys are combined with tubes of other metals, one being inserted in the other, so as to form double or triple tubes. A brass tube may be placed inside or covered with an iron tube, and that again with a copper one; the tubes are then firmly combined together by drawing them through dies or a draw plate. A suitable mode of joining the seams of tubes is also described.

[Printed, 3*d*. See Repertory of Arts, vol. 15 (*enlarged series*), p. 295; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 183; Mechanics' Magazine vol. 52; p. 317; Patent Journal, vol. 9, p. 19.]

A.D. 1849, October 18.—N° 12,813.

WYATT, William.—"Improvements in coating the surfaces of " pumps, pipes, cisterns, and other articles of iron." The surfaces are coated with a protecting glaze. Three parts of white lead, two parts of borax, and one part of calcined flint, are applied in the form of a paste to the surface of the iron, and then fused thereon.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 36 (*conjoined series*), p. 318; Mechanics' Magazine, vol. 52, p. 338; Patent Journal, vol. 9, p. 31.]

A.D. 1849, December 3.—N° 12,876.

STRUBING, Baron James Ulric Vaucher de.—"Improve-" ments in the manufacture of axletree boxes for carriages, and of " the bearings of the axles of railways, and in the making of an " alloy of metal suitable for such and the like purposes." An alloy suitable for forming bearings and linings of axle boxes is

made by combining 75 parts of zinc, 18 of tin, 4½ of lead, and 2½ of antimony. The zinc is first melted; the tin and lead are then added, and, lastly, the antimony, which requires the highest degree of heat. It is by preference melted in a separate crucible and added in a fluid state to the other metals.

[Printed, 1s. See Repertory of Arts, vol. 16 (*enlarged series*), p. 10; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 36; Mechanics' Magazine, vol. 52, p. 458; Patent Journal, vol. 9, p. 102.]

A.D. 1849, December 15.—N° 12,895.

DALTON, ALFRED.—"Improvements in reverberatory and other "furnaces." Furnaces for melting metals are described, with drawings. They have recessed sides in which suitable openings are made to admit atmospheric air above the fire bars at the sides. The melted metals or other matter which may run down the sides of the furnaces are thereby prevented from entering the openings. Perforated plates of iron or bars may be used for forming the sides.

[Printed, 9*d*. See Repertory of Arts, vol. 16 (*enlarged series*), p. 329; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 23; Mechanics' Magazine, vol. 52, p. 493; Patent Journal, vol. 9, p. 140.]

A.D. 1850, January 15.—N° 12,928.

BARCLAY, ANDREW.—" Improvements in the smelting of iro " and other ores, and in the manufacture or working of iron and " other metals, and in certain rotary engines and fans, machinery, " or apparatus as connected therewith."

[No Specification enrolled.]

A.D. 1850, January 19.—N° 12,934.

LAIRD, MACGREGOR.—"Improvements in the construction of " metallic ships or vessels, and in materials for coating the " bottoms of iron ships," &c. Ships are formed of plates of metal made in a corrugated form. Metal vessels or boats are made "in sections with internal flanches" which are fastened together.

Asphalte is used as a coating. The claim to asphalte was disclaimed.

[Printed, 7*d*. See Repertory of Arts, vol. 16 (*enlarged series*), p. 134; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 33; Mechanics' Magazine, vol. 53, p. 76; Patent Journal, vol. 9, p. 188.]

A.D. 1850, February 21.—N° 12,970.

WOOLRICH, John Stephen, RUSSELL, John James, and RUSSELL, Thomas Henry.—"Improvements in obtaining " cadmium and other metals and products from ores or matters containing them."

[No Specification enrolled.]

A.D. 1850, February 21.—N° 12,971.

NEWTON, Alfred Vincent.—"Improvements in separating " and assorting solid materials or substances of different specific " gravities."—(*A communication.*) Crushing, drying, and screening machinery is described, with drawings, for separating copper ores and other ores "from the gangue or foreign matters of " different specific gravities mechanically mixed" therewith. Crushing rollers are used, and revolving screens or sieves, having meshes of different degrees of fineness. The crushed substances are allowed to fall down suitable inclined planes, and are separated according to their various specific gravities.

[Printed, 1*s.* 1*d.* See Mechanics' Magazine, vol. 53, p. 158; Patent Journal, vol. 9, p. 261.]

A.D. 1850, February 27.—N° 12,982.

TODD, Brereton.—"Improvements in the manufacture of " arsenic, sulphuric acid, and the oxide of antimony, from copper " and other ores in which they are combined, and also the oxide " of zinc." Unroasted or uncalcined copper and other ores are submitted "to the oxydating and reducing flame of a blast fur- " nace in connection" with suitable flues and chambers. The spare heat of the blast furnace is applied to heat a "reverberatory " furnace, oven, or retort, by which the volatile and non-volatile " products are obtained," and separated respectively from the matters with which they are combined.

[Printed, 3*d.* See Repertory of Arts, vol. 16 (*enlarged series*), p. 238; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 101; Mechanics' Magazine, vol. 53, p. 179; Patent Journal, vol. 9, p. 262.]

A.D. 1850, March 7.—N° 12,993.

POMEROY, Ebenezer G.—"A new and useful process of " coating iron and other metals with copper and other metallic

"substances." The surface of the iron is cleansed with suitable acid mixtures, and then dipped in a creamy mixture of clay and water, so that a thin layer of clay is deposited on the surface and defend it from oxydation. The iron is then dipped in a bath of molten copper or its alloys, and is allowed to remain long enough to allow the copper to adhere to the iron. The iron, if left too long, will become "hot short," but if allowed to cool gradually it becomes tough and may be rolled.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 166; Mechanics' Magazine, vol. 53, p. 298; Patent Journal, vol. 9, p. 285.]

A.D. 1850, March 7.—N° 12,995.

BROOMAN, Richard Archibald.—"Improvements in types, "stereotype plates," &c.—(*A communication.*) The printing surfaces of the type or stereotype plates are coated with a suitable metal, by preference copper, to protect them and increase their durability. The electro process is used for depositing the coating metal.

[Printed, 5*d*. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 179; Mechanics' Magazine, vol. 53, p. 219; Patent Journal, vol. 9, p. 274.]

A.D. 1850, March 9.—N° 13,001.

HILL, Thomas Irving.—"Improvements in the treatment of "copper and other ores, and obtaining products therefrom." Sulphuret of lead ($\frac{1}{10}$) and carbonate or sulphate of baryta ($\frac{9}{10}$) are combined to form a flux suitable for being used in melting refractory copper ores. Instead of baryta, strontia may be used. $\frac{1}{8}$ flux may be used with $\frac{7}{8}$ ores containing about 12 per cent. of copper.

Oxygen gas is introduced into furnaces used in melting ores. Suitable retorts are erected near the furnace; in them black oxide of manganese is heated, and the oxygen gas generated, is introduced through suitable pipes into the furnace, and employed in increasing the intensity of the heat.

[Printed, 3*d*. See Repertory of Arts, vol. 16 (*enlarged series*), p. 292; London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 179; Mechanics' Magazine, vol. 53, p. 218; Patent Journal, vol. 10, p. 42.]

A.D. 1850, March 19.—N° 13,008.

HORSFALL, William Joseph, and James Thomas.—"Improvements in the rolling of iron and other metals." Rolling

machinery for rolling bars, strips, or sheets of iron or ductile metals, is described with drawings.

The metal is first passed "between rolling surfaces which are "set at an angle to each other," and then "between rolling sur-"faces which are parallel to each other."

Iron bars are thus rolled, which suited by tyres being of the required conical shape, instead of being cylindrical, when formed into a hoop.

Zinc and ductile metals and alloys are rolled into thin sheets or strips or lengths "forming the segment of a circle, and which "when divided by lines radiating from the centre of that circle, "and cut into pieces at those lines, may be formed into conical "pipes and vessels with little or no scrap waste."

[Printed, 10*d*. See London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 237; Mechanics' Magazine, vol. 53, p. 254; Patent Journal, vol. 9, p. 297.]

A.D. 1850, March 23.—N° 13,020.

ROSELEUR, ALFRED GUILLAUME.—"Improvements in coat-"ing or covering metals with tin." Small articles are coated with tin by immersing them in a bath composed of "22 lbs. of "water, 17½ oz. of ammoniacal alum, 1 oz. of protochloride of "tin or other salt of the same base."

An even coating of tin is deposited on surfaces which need not be cleansed, as they are "scoured as well as tinned" by a process of "immersion and double affinity." Polished or finished surfaces are coated with fine even white deposit of tin. The bath is formed by digesting "in a hot state in 17½ pints of soft water, "10½ oz. of bi-tartrate of potash or soda (tartaric acid or acidu-"lated tartriate of potash or soda, cream of tartar." Into this is poured "an aqueous solution consisting of ¾ oz. of protochloride "or other salt of tin." The liquid turns milky, then clears, and is then fit for coating articles which are dipped therein with a few pieces of zinc in small proportion to the articles immersed.

For the electro-tinning process, the bath is composed of "17½ "oz. of water deprived of alkaline salts, 11 lbs. of pyrophosphate "of potash or soda, and 4 lbs. 7 oz. of protochloride of melted "tin." An anode of tin forms the positive pole of the battery used.

[Printed, 4*d*. See Mechanics' Magazine, vol. 53, p. 255; Patent Journal vol. 9, p. 296.]

A.D. 1850, April 15.—N° 13,042.

ATTWOOD, GEORGE.—" A new or improved method of making " tubing of copper or alloys of copper." Old or worn out copper printing rollers or other cylinders of copper or its alloys, which are made without seam, are converted into tubes by removing any ribs or slots that there may be inside them; they are then made into tubes by drawing or rolling them out. Care must be taken to anneal them as often as may be necessary.

[Printed, 3d. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 184; Mechanics' Magazine, vol. 53, p. 277; Patent Journal, vol. 10, p. 5.]

A.D. 1850, April 20.—N° 13,053.

BROOMAN, RICHARD ARCHIBALD.—" Improvements in the manufacture of zinc, and the apparatus employed therein."—(*A communication.*) The specification and drawings describe a furnace somewhat resembling in shape a small blast furnace, which is used for extracting zinc directly from the ores without previously assorting and crushing them. Suitable pipes for collecting the fumes and condensing chambers are described.

Quick lime is used as a flux, and if the ores contain baryta, fluorine is added. Substances capable of re-oxydising zinc are not to be introduced into the furnace. Cast or malleable iron is used to expel or take up excess of sulphur.

[Printed, 10d. See London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 31; Mechanics' Magazine, vol. 53, p. 321; Patent Journal, vol. 10, p. 56.]

A.D. 1850, April 23.—N° 13,054.

RITCHIE, WILLIAM HENRY.—" Improvements in the manu-" facture of copper, brass, and other tubes or pipes."—Rolling machinery for rolling cast tubes of copper and its alloys is described with drawings. The rolls have tapering grooves, and have an alternating motion, and " take the tubes further and " further into the grooves at the successive alternations."

[Printed, 6d. See Repertory of Arts, vol. 16 (*enlarged series*), p. 339; London Journal (*Newton's*), vol. 38 (*conjoined series*), p. 29; Mechanics' Magazine, vol. 53, p. 332; Patent Journal, vol. 10, p. 43.]

A.D. 1850, April 30.—N° 13,067.

PROTHEROE, EDWIN.—" Improvements in the manufacture of " the oxide of zinc," &c.—(*A communication.*) Retorts and a

reverberatory furnace and other apparatus are described with drawings for producing oxides of zinc "without reducing the zinc "into vapour or distilling the same." The oxide "is divided "into two qualities, the lighter portion of it will be carried off "and deposited in chambers suitably arranged to secure it, and "the heavier parts will be deposited upon the zinc under opera-"tion, from whence it is to be removed as fast as it is formed."

[Printed, 1*s*. 1*d*. See Repertory of Arts, vol. 17 (*enlarged series*), p. 214; Mechanics' Magazine, vol. 53, p. 357; Patent Journal, vol. 10, p. 54.]

A.D. 1850, June 11.—N° 13,118.

PARKES, Alexander.—"Improvements in smelting and "treating certain metals, and in the construction and manufac-"ture of furnaces and the materials to be used for the same," &c. A calcining furnace is described with the aid of drawings; it consists of several floors or stages, under each of which the heated products of combustion pass. A hollow iron shaft is placed in the centre of the furnace, and arms or rakes are attached thereto, which, when the shaft turns, stir up the ores placed on the various floors to be calcined. Silver is separated from lead by adding about one cwt. of zinc to every ton of melted lead. When the mass cools the zinc crystallises and abstracts silver. The zinc may be remelted and again used until it is saturated with silver, of which a cwt of zinc will abstract "400 or 500 oz." The silver is separated from the zinc by dissolving in diluted muriatic or sulphuric acid.

Fire bricks are made by combining sulphates of lime and baryta, or carbonate or caustic lime with silex or quartzous substances in a pulverised state, and moulding them and drying in the usual way. Steam, in a finely divided state, is injected into and among burning anthracite coal to promote combustion.

[Printed, 10*d*. See Repertory of Arts, vol. 17 (*enlarged series*), p. 70; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 436; Mechanics' Magazine, vol. 53, p. 496; Patent Journal, vol. 10, p. 128.]

A.D. 1850, June 24.—N° 13,152.

PERCY, John, and WIGGIN, Henry.—"A new metallic alloy "or new metallic alloys."

[No Specification enrolled.]

A.D. 1850, July 17.—N° 13,177.

GOSSAGE, William Herbert.—" Improvements in obtaining " certain metals from some compounds containing such metals," &c. Copper or silver may be obtained from " burnt pyrites " or the refuse residuum left when sulphuret of iron is burnt to obtain sulphuric acid or sulphate of soda. The burnt pyrites residuum is ground and mixed with about an equal weight of impure sulphuret of calcium or "alkali waste" and one third its weight of sand. The mixture is melted in copper smelting furnace. A regulus is produced which is ground and mixed with 4 parts of common salt, and one part of coal for each part of sulphur contained in the regulus.

The mixture is worked up with moistened clay into balls and calcined for about 6 hours in a kiln; sulphate of soda and hydrochloric acid and chlorides or oxides of the metals contained in the regulus are produced by the process. Silver and copper are obtained by dissolving in water and precipitating with iron, or by other suitable methods.

Galena is mixed with the regulus containing iron, copper, and silver, or other metals; the lead combines with and takes up silver, and is separated in any convenient way. Or the regulus is digested in hydrochloric acid.

[Printed, 5*d*. See Repertory of Arts, vol. 22 (*enlarged series*), p. 125; Mechanics' Magazine, vol. 54, p. 76; Patent Journal, vol. 10, p. 186.]

A.D. 1850, July 23.—N° 13,192.

NEWTON, William Edward.—" Improvements in obtaining, " preparing, and applying zinc and other volatile metals and the " oxides thereof, and in the application of zinc or ores containing " the same, to the preparation or manufacture of certain metals or " alloys of metals."—(*A communication.*) Furnaces for the reduction of zinc are made with such an arrangement of fire-places and flues " that the products of combustion after giving off " their caloric to the retorts in the chamber, may be reverberated " by a closed arch top and carried downwards, and conducted " away through openings situated at or near the bottom." The retort chambers are formed " by making the front and rear walls " thereof of hexagonal blocks or forms with central apertures to " receive the ends of the retorts."

A single "large retort muffle or oven" may be used instead of several retorts.

Zinc is alloyed with steel or iron by a process of cementation. The metals are laid in alternate layers with carbonaceous matter interposed in suitable furnaces or boxes or other vessels, and cemented, as in the ordinary converting process. Instead of metallic zinc, its oxides, as red oxide or "franklinite," may be used.

A porous or fibrous bag or air chamber with porous sides is connected with the blowing or exhaust apparatus, so that the volatile or other escaping products may be arrested and collected. Condensing apparatus is employed therewith.

Ores and natural oxides of zinc, franklinite, calamine, or the carbonate of blende, &c. are wasted, pulverised and made into pigments.

Franklinite may be also mixed with iron in the various stages of its manufacture and improves its quality; 5 per cent. will, it is stated, cure "cold short;" 10 per cent. will cure "hot short." Collecting and condensing apparatus is used to economise the use of the zinc.

[Printed, 1*s*. 10*d*. See London Journal (*Newton's*), vol. 39 (*conjoined series*), p. 235; Mechanics' Magazine, vol. 54, p. 98; Patent Journal, vol. 10, p. 249.]

A.D. 1850, August 6.—N° 13,214.

CROSSKILL, William.—" Improvements in mills for grinding, " splitting, pulverizing, and crushing grain, bones, bark, ore, and " other hard substances," &c. Grinding mills which may be used for crushing ores are described with drawings. Stones or metallic plates are used for grinding surfaces. They are adjusted by means of a lever and set screw, and revolve eccentrically to one another.

[Printed, 1*s*. See Mechanics' Magazine, vol. 54, p. 159; Patent Journal, vol. 10, p. 221.]

A.D. 1850, August 9.—N° 13,216.

STEELE, Joseph.—" Improvements in coating and impregnat- " ing metals and metallic articles." Metallic surfaces are coated with tin, copper, or its alloys, or gold or silver, by the electro process. Suitable solutions are described.

For the tinning solution: in 75 gallons of distilled water, heated, are dissolved 60 lbs. of common soda, 15 lbs. of American or Russian potash, 5 lbs. of caustic potash, 2 oz. of cyanide of potassium, 2 oz. of acetate of zinc, 16 lbs of bioxide of tin.

For a solution of alloy of copper: in 6 gallons of distilled water (heated) dissolve 2¼ lbs. of American potash; mix therewith 2½ oz. of acetate of copper dissolved in ½ pint of strong spirits of ammonia, dissolve in some of the solution and in a separate vessels 5 oz. of sulphate of zinc, also 2 oz. of cyanide of potassium; add them to the bath.

For a gilding solution, dissolve an ounce of gold in a mixture of 8 oz. of nitric and 4 oz. of hydrochloric acid, and evaporate to powder; take 24 oz. of prussiate of potash, and 12 oz. of carbonate of potash, melt them together in a vessel; when vitrified, boil them in water, cool, and filter, and add the gold powder, and boil the mixture with water.

For a silver solution: dissolve silver in nitric acid, mix with salt and water, collect the precipitated silver, wash it and mix with the solutions of potash, as is done for the gilding solutions.

[Printed, 4*d*. See Mechanics' Magazine, vol. 54, p. 134; Patent Journal, vol. 10, p. 220.]

A.D. 1850, August 22.—N° 13,232.

NEWTON, WILLIAM EDWARD.—"Improvements in refining "gold."—(*A communication.*) Gold in its unrefined state is reduced to a finely divided or disintegrated molecular state, to enable dissolving acids to act freely on the impurities with which the gold is combined.

This is effected by melting the gold with about 2 or 3 times its weight of zinc and granulating the alloy in water; or by rendering the gold brittle by combining therewith lead or solder, and grinding the mixture. Other base metals, as iron or copper, may be melted with the gold.

The gold in its finely divided state, or the granulated alloy, is treated with dissolving acids or mixtures in wooden vats lined with lead.

Silver and other metals are separated in the usual way. The gold, when refined, is melted with fluxes, as borax, nitre, &c., and cast into ingots.

[Printed, 4*d*. See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 433; Mechanics' Magazine, vol. 54, p. 178; Patent Journal, vol. 10, p. 252.]

A.D. 1850, September 5.—N° 13,245.

BARCLAY, Andrew.—" Improvements in the smelting of iron " and other ores," &c. Furnaces for smelting ores are described with drawings. Several tuyeres at different heights are used, and a suitable arrangement of blowing apparatus and chambers for heating the blast.

A fan with double angular blade is used.

Steam may be injected with the blast.

[Printed, 1s. 10d. See Mechanics' Magazine, vol. 54, p. 215; Patent Journal, vol. 11, p. 26.]

A.D. 1850, September 19.—N° 13,261.

NASMYTH, James, and BARTON, John.—" Improvements " in the manufacture of copper or other metallic rollers," &c. Rollers of copper or other metals or alloys are cast in the usual way. Before the metal is cooled, it is subjected suddenly to very great pressure by means of apparatus constructed on the principle of the steam hammer. The sudden pressure gives great solidity and compactness to the copper.

[Printed, 10d. See Mechanics' Magazine, vol. 54, p. 257; Patent Journal, vol. 11, p. 3.]

A.D. 1850, September 26.—N° 13,262.

HOULDSWORTH, Henry.—" Improvements in the manufac- " ture of iron and other metals." The specification and drawings describe smelting furnaces in which the waste products of combustion are applied to heat furnaces for calcining ores.

The blast is injected in "a broad fan-like sheet" by means of suitably shaped annular tuyeres.

[Printed, 1s. 4d. See Mechanics' Magazine, vol. 54, p. 277; Practical Mechanics' Journal, vol. 3, p. 278, and vol. 5, p. 4; Patent Journal, vol. 11, p. 5.]

A.D. 1850, October 10.—N° 13,283.

GURLT, Adolf Frederick.— "An improved method of " extracting silver from argentiferous minerals." The argentiferous ore or regulus containing silver in the state of sulphuret is subjected to the action of a concentrated solution of common

salt or chlorides of potassium, ammonium, &c. (about 100 parts), combined with a chloride of copper, iron, or zinc, &c. (about 10 or 15 parts). The sulphuret of silver is converted into a chloride and dissolved, and separated by filtration from the metals with which it was combined.

The argentiferous solution may be "deprived of its silver by "cementation, and may be again used for extracting silver from "another portion of ore or regulus."

[Printed 4*d*. See Repertory of Arts, vol. 17 (*enlarged series*), p. 362; Mechanics' Magazine, vol. 54, p. 316, and vol. 58, p. 80; Patent Journal, vol. 11, p. 25.]

A.D. 1850, November 2.—N° 13,303.

HODGKINSON, Matthew.—"Improvements in furnaces or "apparatus for smelting ores and minerals, &c. A furnace for melting ores is described with drawings. It has an inclined floor, on which the charge of ore and fuel is placed; the air is "admitted "to the upper part of the charge" to support combustion. The molten metal runs down the inclined floor to the pot or hearth. Blowing apparatus is dispensed with.

[Printed, 9*d*. See London Journal (*Newton's*), vol. 39 (*conjoined series*), p. 63; Mechanics' Magazine, vol. 54, p. 379; Patent Journal, vol. 11, p. 60.]

A.D. 1850, November 7.—N° 13,323.

CLARE, John, junior.—"Improvements in the manufacture of "metallic casks." Casks are made of thin metal staves, which may be joined together by suitable heads and hoops and screws and nuts, and taken to pieces and reconstructed, as required.

If iron be used, the iron is coated with zinc.

[Printed, 8*d*. See Repertory of Arts, vol. 17 (*enlarged series*), p. 343; Mechanics' Magazine, vol. 54, p. 397; Patent Journal, vol. 11, p. 76.]

A.D. 1850, November 14.—N° 13,342.

SWINDELLS, John.—"Improvements in obtaining products "from ores and other matters containing metals," &c. Ores containing copper and silver or copper only are calcined, to drive off sulphur, and then saturated in tanks, with a solution of ammonia of strength about 0·980°. In about 24 hours the ammonia is drawn off, and will be combined with the oxides of copper

or silver, which are separated in the usual way. Zinc ores, or ores containing chromium, are mixed with equal weights of common salt, and calcined, and dissolved in water in the usual way.

[Printed, 3*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 153; London Journal (*Newton's*), vol. 39 (*conjoined series*), p. 342; Mechanics' Magazine, vol. 54, p. 415; Practical Mechanics' Journal, vol. 4, p. 133; Patent Journal, vol. 11, p. 85.]

A.D. 1850, November 30.—N° 13,376.

AINSLIE, JOHN.—" Apparatus for the manufacture of bricks " and crushing ores." Grinding apparatus, and also kilns, are described with drawings. Two or more circular plates of metal having surfaces of a conical, bevelled, or other shape, revolve on spindles, in one or more sets; ores, or minerals, or earths are introduced by a suitable feeding apparatus, between the revolving surfaces, and are ground to powder. Calcining kilns, having a circular arrangement and flues winding round in a spiral form, are described.

[Printed, 7*d*. See Mechanics' Magazine, vol. 54, p. 458; Patent Journal, p. 133.]

A.D. 1850, November 30.—N° 13,377.

ELMSLIE, JAMES AUGUSTUS, and SIMPSON, GEORGE.— " Improvements in sheathing of ships," &c. Metals and alloys " known as tin, tinfoil, and other alloys of metals of a like nature," are applied in sheets to the bottoms of ships, " dispensing with " the use of felt, or paper materials, between the bottom of the " vessel and the ordinary sheathing."

Tin foil and similar alloys are also used for making cartridges, cases for rockets, and fire works, and for covering gun wads.

[Printed, 5½*d*. See Mechanics' Magazine, vol. 54, p. 457; Patent Journal, vol. 11, p. 218.]

A.D. 1850, December 7.—N° 13,390.

PAPPS, FRANCIS.—" Improvements in metallic and other bed- " steads," &c., and covering metals. A mode of constructing bedsteads is first described.

Metallic surfaces are coated with metals or alloys by the electro process. The usual metallic solutions are used, and " anodes " composed of the same proportions as the solutions, to be deposited therefrom."

For depositing gold alloys: "an anode composed of 1 to 20 parts "of copper and 40 parts of gold" is used. For silver alloys: "from "1 to 30 parts copper and 30 parts silver." For brass: 1 to 20 parts copper and 40 parts zinc. For bronze: 1 to 20 parts copper and 40 parts tin. For tin: 1 part nickel or zinc, and 40 parts tin. Cyanide solutions are used by preference.

[Printed, 1*s*. 7*d*. See Mechanics' Magazine, vol. 54, p. 479; Patent Journal, vol. 11, p. 248.]

A.D. 1850, December 12.—N° 13,401.

MOREWOOD, Edmund, and ROGERS, George.—"Im-"provements in coating or covering metals." Zinc is coated with lead by a casting process. The bottom of a suitable shallow pan is covered with molten lead, molten zinc is poured thereon, and the impurities as they rise are removed, when cold, the compound slab is removed and may be rolled. Or a sheet or slab of spelter or zinc is coated, when at a temperature a little above the melting point of lead, by sprinkling sal ammoniac on its surface, and rubbing it with a stick of lead, and pouring thereon melted lead. A similar process is employed for attaching "zinc or ductile "alloys of copper and zinc" to sheets of copper or other metals. Sheet iron is combined with sheet zinc, or lead, or alloys, by laying sheets thereof on the surface of the iron which is previously coated with zinc. The surface is wetted with a weak solution of muriatic acid and laid on a hot cast-iron plate, a hot roller is slowly passed over the sheets and melts the alloy, a colder roller follows which smooths the surfaces.

The baths required for coating metals may be heated in a suitable reverberatory furnace.

[Printed, 4*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 175; Mechanics' Magazine, vol. 54, p. 514; Patent Journal, vol. 11, p. 134.]

A.D. 1850, December 16.—N° 13,412.

RODHAM, Richard, and HOBLYN, Edward Robert.— "Improvements in machinery and apparatus for condensing and "purifying smoke, gases," and condensing metallic fumes. Furnaces are described (with drawings), which are connected with an arrangement of flues, and water tanks, and exhaust apparatus, for collecting and condensing gases and metallic fumes. The exhaust apparatus consists of curved fans of a peculiar shape,

which are made to revolve at high velocities, and create the requisite draught.

[Printed, 1s. 1d. See Mechanics' Magazine, vol. 54, p. 514; Patent Journal, vol. 10, p. 237.]

A.D. 1850, December 20.—N° 13,424.

GOSSAGE, WILLIAM HERBERT.—"Improvements in the con-" centration of sulphuric acid," and use of burnt pyrites for producing sulphates, "and copper or salt of copper." Apparatus for concentrating sulphuric acid is described with drawings. Beds of siliceous pebbles are suitably arranged in a tower or shaft, and the fumes and gases are passed through them.

Sulphate of alumina, alum and sulphate of iron, and copper are obtained from "burnt pyrites." To obtain iron and copper, the powder of burnt pyrites is mixed with one-fifth of raw pyrites, and made into balls with clay, and heated in a kiln. The product is lixiviated in vitriol and water. A solution containing protosulphate, and persulphate of iron, and sulphate of copper, is obtained. The copper is separated by metallic iron.

[Printed, 11d. See Mechanics' Magazine, vol. 54, p. 517; Patent Journal, vol. 11, p. 160.]

A.D. 1851, January 2.—N° 13,438.

COOK, BENJAMIN.—"A certain improvement or certain im-" provements in the manufacture of metallic tubes."

[No Specification enrolled.]

A.D. 1851, January 2.—N° 13,439.

PERCY, JOHN, and WIGGIN, HENRY.—"A new metallic alloy" or new metallic alloys."

[No Specification enrolled.]

A.D. 1851, January 11.—N° 13,442.

GRISSELL, HENRY, and REDWOOD, THEOPHILUS.—"Im-" provements in coating metals with other metals." Iron is coated with zinc by immersing it in a bath of molten zinc, on the surface of which is a thick protecting stratum of chloride of zinc, or a mixture of 8 parts chloride of zinc and 10 parts chloride of

potassium, or equal parts of chloride of zinc and chloride of sodium, or equal parts of anhydrous sulphate of zinc and chloride of sodium and chloride of potassium. A bath of coating alloy is formed by melting 2c parts of tin, 10 parts of zinc, and 5 parts of lead. A stratum of equal parts of chloride of zinc and sal ammoniac is used. A fusible alloy of 8 parts bismuth, 5 parts lead, and 3 parts tin, is used.

In coating iron with silver the iron is first coated with an amalgam of 12 parts mercury, 1 part zinc, 2 parts of sulphate of iron, 2 parts of muriatic acid.

In coating iron with copper, brass, or other alloys, a protecting stratum of borosilicate of lead is used; it is made by fusing 24 parts of boracic acid, 112 parts of oxide of lead, and 16 parts of silica together.

[Printed, 4*d.* See Repertory of Arts, vol. 18 (*enlarged series*), p. 119; Mechanics' Magazine, vol. 55, p. 73; Patent Journal, vol. 11, p. 180.]

A.D. 1851, January 18.—N° 13,461.

MUNTZ, George Frederick, junior.—" Improvements in " furnaces applicable to the melting of metals for making brass, " yellow metal, and other compound metals." A furnace is described, with drawings, so constructed that the part containing the metal can be converted into a close or nearly close chamber, while the metal is being mixed or stirred, thereby preventing great loss by volatilization.

Dampers are fitted, one into the bridge to close or open the passage between the fire and the metal, and another between the metal and the chimney. An additional flue or passage fitted with a damper connects the fire directly with the chimney.

[Printed, 1*s.* 1*d.* See Repertory of Arts, vol. 18 (*enlarged series*), p. 185; Mechanics' Magazine, vol. 55, p. 79; Patent Journal, vol. 11, p. 209.]

A.D. 1851, January 31.—N° 13,480.

JOHNSON, Richard.—" Improvements in annealing articles " of iron and other materials." An annealing oven and pots, and other apparatus, are described, with drawings. The apparatus is specially adapted for annealing wire. The principle of the invention consists in using " a flue or flues situated in the interior " of the annealing pots or ovens."

[Printed, 10*d.* See London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 462; Mechanics' Magazine, vol. 55, p. 119; Patent Journal, vol. 11, p. 220.]

A.D. 1851, January 31.—N° 13,486.

STIRLING, John Davié Morries.—"Improvements in the "manufacture of metallic sheets in coating metals in metallic "compounds and in welding." Polished rolls are used for rolling sheet metals to give them smooth surfaces.

Iron may be coated with tin or its alloys by first coating it with zinc and cleaning the surface with acid, and then dipping it in melted tin.

Sheet zinc is cleansed in acid, by preference diluted hydrochloric acid, and then coated with tin by the dipping process; it may be then rolled.

Lead and its alloys may be coated with tin by cleansing it with acid and dipping it, or by employing the hydraulic press, as in coating lead pipes, as described

Zinc may be similarly coated with tin and its alloys, or sheets of the one metal may be spread upon and attached to the other by the rolling process. Zinc in thin sheets, or calamine in paste, is used in welding or rolling plates of iron, being interposed between layers thereof, and is said to improve the quality of the iron, especially if it be "cold short."

[Printed, 4*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 317; Mechanics' Magazine, vol. 55, pp. 134, 374; Patent Journal, vol. 12, p. 14.]

A.D. 1851, February 3.—N° 13,490.

ALLIOTT, Alexander.—"Improvements in cleaning, dyeing, "and drying machines," and manufacturing metals. Various machines for drying woven fabrics and other purposes, constructed on the centrifugal principle, are described, with drawings. A similarly constructed machine is used for mixing or alloying molten metals.

The metals are introduced into a cylindrical vessel, which is made to rotate at a great speed, and so intimately mix up the metals.

[Printed, 10*d*. See Mechanics' Magazine, vol. 55, pp. 136, 161; Patent Journal, vol. 11, p. 239.]

A.D. 1851, February 12.—N° 13,512.

TUPPER, Charles William, and NORMANDY, Alphonse René le Mere de.—"Improvements in the manufacture of

" iron coated with other metal, commonly called galvanized " iron."

[No Specification enrolled.]

A.D. 1851, February 17.—N° 13,513.

COWPER, Charles.—" Improvements in moulds for electro- " metallurgy."—(*A communication.*) The moulds are made of gelatine or glue, gutta percha, or caoutchouc, or other similar elastic or glutinous substance.

The model is covered with fine wires or strips or pieces of metal. The gelatine or gutta percha is melted and applied thereto; when it is cool the model is removed. The surface of the cast, in which the wires are imbedded, is coated with plumbago, and being immersed in a suitable solution in connection with a battery is evenly coated with the metallic deposit, the wires acting as conductors.

[Printed 3*d*. See Mechanics' Magazine, vol. 55, p. 158; Patent Journal, vol. 11, p. 279.]

A.D. 1851, March 20.—N° 13,561.

ROBERTSON, Alexander, and GLOVER, James.—" Im- " provements in the rolling and laminating of metals," &c. Rolling apparatus for rolling soft ductile metals, as tin or lead and their compounds, is described, with drawings.

Springs, or hydraulic pressure applied by means of suitable pistons and cylinders, are used for giving an elastic pressure to the rolls, and regulating the same, as required.

[Printed, 10*d*. See Mechanics' Magazine, vol. 55, p. 259; Patent Journal, vol. 12, p. 12.]

A.D. 1851, March 31.—N° 13,577.

GWYNNE, JOHN.—" Improvements in machinery for pump- " ing," &c., and separating metals from their ores. A centrifugal pump and other machines are described, with drawings, and among them apparatus for washing ores and amalagating gold and mercury, constructed on the centrifugal principle.

[Printed 3*s*. 11*d*. See Mechanics' Magazine, vol. 55, p. 299; Practical Mechanics' Journal, vol. 4, pp. 107, 121, 126, and 147; Patent Journal, vol. 12, p. 37.]

A.D. 1851, May 10.—N° 13,630.

LONGMAID, WILLIAM.—" Improvements in treating ores and " minerals," &c. Ores containing silver, and copper, and sulphur and other volatile matters, are calcined, pulverised, and mixed with salt, and again calcined.

The calcined mass, " or sulphate ash," is lixiviated in water, sulphate of soda and soluble salts of silver and copper are dissolved, the silver is precipitated on copper, and the copper subsequently precipitated on iron. Sulphide of calcium, such as alkali waste, may be used as a precipitate. Other modes of precipitation are described.

[Printed, 4*d*. See Repertory of Arts, vol. 18 (*enlarged series*), p. 381; Mechanics' Magazine, vol. 55, p. 416; Patent Journal, vol. 12, p. 72.]

A.D. 1851, June 7.—N° 13,656.

BANISTER, JAMES.—" Improvements in the manufacture of " metallic tubes for steam boilers and other uses." Apparatus for gradually heating tubes, and soldering them, is described with drawings.

The solder used is a mixture of a low melting solder,—40 parts spelter and 36 parts of copper; and a high melting solder, 40 parts spelter and 42 parts copper. Equal parts of the two solders are mixed with borax.

[Printed, 1*s*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 15; Mechanics' Magazine, vol. 55, p. 496; Practical Mechanics' Journal, vol. 3, p. 94.]

A.D. 1851, June 24.—N° 13,675.

PARKES, ALEXANDER.—" Improvements in separating silver " from other metals." These are based on the process described in the specification of former Letters Patent (see *ante*, N° 13,118, p. 177. Zinc is mixed and melted with lead containing silver, in certain proportions.

				lbs.
With a ton of lead containing	14 oz.	of silver	-	22·4 of zinc.
„ „	21	„		33·6 „
„ „	28	„		44·8 „

When the lead is about to cool down the alloy of zinc and silver rises to the surface, and is removed with a perforated ladle. The zinc remaining in the lead is removed by placing the lead in

a furnace, and keeping it at a dull red heat, the zinc oxydises on the surface of the lead, and is removed, or the lead is tapped off. The silver is separated from the zinc by oxydising and digesting in acids or by distillation.

[Printed, 3*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 236; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 439; Mechanics' Magazine, vol. 56, p. 18, and vol. 58, p. 80.]

A.D. 1851, August 14.—N° 13,718.

SKINNER, THOMAS.—" Improvements in producing ornamental " surfaces on metal and other materials." Impressions are transferred from copper or other plates or printing surfaces to the surface of the metal. Suitable acids and protecting substances are then used in such a way that the required parts of the surface are removed so as to form suitable patterns. These, or the remaining parts, may then be coated with metallic deposits in patterns.

[Printed, 3*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 172; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 354; Mechanics' Magazine, vol. 56, p. 158; Artizan, vol. 10, p. 66.]

A.D. 1851, September 11.—N° 13,746.

PARKES, ALEXANDER.—" Improvements in the manufacture " of copper and the separation of some other metals therefrom, " and in the production of alloys of certain metals." Iron and zinc may be advantageously combined with copper in certain stages of its manufacture, as in the state of " white metal," or in more advanced stages when sulphur is present.

Argentiferous compounds of copper are treated with zinc and arsenic in a fused state. A suitable reverberatory furnace, provided with collecting and condensing apparatus, is used.

If the argentiferous compounds contain 10 oz. of silver to the ton it is melted in the reverberatory furnace, and to each ton three to five per cent. of metallic zinc, and ¼ to ½ per cent. of white arsenic, and about ½ cwt. of anthracite coal or other fuel are added; heat is applied for about six hours.

If the compound be a sulphuret, chiefly from six to ten per cent. of calamine, with lime or other flux may be added.

If the compound be an oxide or carbonate, chiefly from 10 to 15 per cent. of blende or other sulphur compound may be added.

If the quantity of silver present be large, more zinc and arsenic

may be added in proportion. Oxide of chromium and oxide of nickel may be alloyed in equal parts, or two of chromium and one of nickel may be fused in a closed crucible, covered with a carbonaceous flux. The following form useful alloys :—

Nickel and chromium,	10	parts,	and tin	90	parts;
or ,,	20	,,	and iron	80	,,
or ,,	20	,,	and copper	60	,,
			and zinc	20	,,

[Printed, 3*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 318; London Journal (*Newton's*), vol. 40 (*conjoined series*), p. 284; Mechanics' Magazine, vol. 56, p. 288, and vol. 58, p. 80.]

A.D. 1851, September 25.—N° 13,752.

GREEN, Charles.—" Improvements in the manufacture of " brass tubes." Brass tubes after being partly made by drawing and annealing them by the ordinary process are, before being drawn for the last time, treated with diluted acid, then washed in cold water, then boiled in hot water for 10 or 15 minutes, then immersed in a solution of soap for five or six minutes, then finally drawn with a stream of soap and water falling on them. The tubes are annealed at both ends to allow of their being properly fixed in steam boilers.

[Printed, 3*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 312; and Mechanics' Magazine, vol. 56, p. 276.]

A.D. 1851, September 25.—N° 13,755.

WATT, Charles.—" Improvements in the decomposition of " saline and other substances," &c., " and also in the separating " of metals from each other, and in freeing them from im- " purities." Apparatus consisting of batteries and suitable vessels are used for applying electric agency to the decomposition of saline compounds, and obtaining the metals of the alkalies and alkaline earths; and for separating metals from other metals with which they are alloyed, by dissolving the alloys and effecting the requisite separate depositions.

[Printed, 8*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 301; Mechanics' Magazine, vol. 56, p. 277.]

A.D. 1851, November 4.—N° 13,800.

VIVIAN, Henry Hussey. — " Improvements in obtaining " nickel and cobalt."—(*A communication.*) Nickel and cobalt are

obtained from copper ores and compounds in the form of arsenurets. Arsenical pyrites may be mixed with copper ores and slags to take up nickel and cobalt. In treating an oxide of copper produced by calcining regulus of copper of 70°/° about "eight cwt. of arsenical pyrites, 12 cwt. of raw ore furnace metal "of about 30°/° sulphur, and two cwt. of coal to 20 cwt. of the "oxide" may be used.

Other proportions are given for other ores and compounds of copper.

[Printed, 4*d*. See Repertory of Arts, vol. 19 (*enlarged series*), p. 346; Mechanics' Magazine, vol. 56, p. 378.]

A.D. 1851, November 15.—N° 13,817.

SISCO, ANTOINE DOMINIQUE.—"Improvements in the manu-"facture of chains, and in combining iron with other metals "applicable to such and other manufactures." Strips or ribbons of iron or steel and iron are brazed or soldered together in lamina, to form links of chains. The solder is composed of cast iron, combined with $\frac{1}{8}$ of red copper, $\frac{1}{8}$ wrought-iron scrap, and $\frac{1}{4}$, by weight, of manganese.

Suitable machinery is described for forming the links and chains.

[Printed, 2*s*. 4*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 26; Mechanics' Magazine, vol. 56, p. 435; Practical Mechanics' Journal, vol. 4 p. 214; Artizan, vol. 9, p. 263.]

A.D. 1851, December 22.—N° 13,877.

STIRLING, JOHN DAVIE MORRIES.—"Certain alloys and "combinations of metals." The specification of former Letters Patent, dated January 31, 1851, is referred to (see N° 13,486, p. 187.) Iron plates should be coated with copper by the dipping process before they are coated with zinc or tin. They may be previously passed through polished rolls. "Saline solution as that of sal-"ammoniac" may be used instead of acid to cleanse the surfaces of the plates.

"Hardened lead" is covered or coated with tin or ductile alloys by rolling a plate of one metal upon the other, and giving "a severe pinch by means of the rolls."

Lead may be hardened by melting with 95 parts thereof five parts of an alloy formed of tin and zinc, in equal parts. One part

of antimony mixed with 15 parts of lead hardens the latter. From one to two per cent. of arsenic hardens lead. Tin, Britannia metal, and tin hardened with antimony, form good coating metals for hardened alloys of lead. Zinc may be coated with lead and its alloys. Zinc or tin, or their ductile alloys, may be combined with cadmium by pressing sheets of these metals together. By a similar process copper and its ductile alloys may be coated with tin and its ductile alloys. The latter and other metals may be similarly coated with silver or gold. The fusible metals and their alloys may be cast on plates of silver or platinum, and rolled to the desired thickness. German silver may be soldered to copper and rolled.

Chromium, and also lead, with or without chlorides, baryta and its salts, carbonate of lime, and muriate of soda, may be added in the specified proportions to iron, and impart improved qualities to it.

Iron coated with an alloy of tin and arsenic, or lead and arsenic, is useful for shipbuilding purposes.

[Printed, 4*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 47; Mechanics' Magazine, vol. 56, p. 518.]

A.D. 1851, December 24.—No 13,881.

NEWTON, ALFRED VINCENT.—" Improvements in separating " substances of different specific gravities."—(*A communication.*) Copper ores or other ores are crushed, and then are placed in a pan, which is slightly curved upwards towards its front part. Suitable motion is given to the pan by cranks or other apparatus, and currents of water or other fluid may be employed, which, in combination with the motion given to the pan, separate the heavier particles from the lighter ones by centrifugal action and the action of gravity.

[Printed, 10*d*. See Mechanics' Magazine, vol. 57, p. 19.]

A.D. 1851, December 24.—N° 13,882.

SOLA, ANTONIO DE.—" Improvements in the treatment of " copper minerals."—(*A communication.*) The ores are sorted or combined with sulphur, so that they contain proper quantity of sulphur, and are converted by calcination into sulphates. The calcined ores are placed with water in basins situated one below

another, and communicating. In these the ores are treated by a dissolving process, and the action of a large voltaic battery is employed to deposit the metal from the solution.

[Printed, 6*d*. See Mechanics' Magazine, vol. 57, p. 19.]

A.D. 1851, December 31.—N° 13,889.

GREENSTREET, Francis Hastings.—" Improvements in " coating and ornamenting zinc."—(*A communication*.) The zinc is used pure and free from alloy. The surface of the zinc is acted upon in certain parts by acids, so as to produce figures or designs. On these parts pigments or varnishes may be applied so as to produce ornamental patterns.

[Printed, 5*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 108; Mechanics' Magazine, vol. 57, p. 36.]

A.D. 1852, January 24.—N° 13,914.

STURGES, Richard Ford.—" An improved method, or im- " proved methods of ornamenting metallic surfaces." Surfaces of gold, silver, copper, iron, and soft metals and alloys are ornamented by placing patterns formed in wire, sheet metal, paper, lace, or other figured substances between two sheets of the metal required to be ornamented. The sheets are then passed through rollers, and the figures required are impressed in their surfaces.

[Printed, 3*d*. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 341; Mechanics' Magazine, vol. 57, p. 116; Practical Mechanics' Journal, vol. 5, p. 135.]

A.D. 1852, January 29.—N° 13,939.

BAGGS, Isham.—" Improvements in crushing gold quartz and " metallic ores." These relate to apparatus for stamping and crushing ores, wherein the direct action of steam or atmospheric pressure is applied to give motion to a stamper. An independent cylinder is employed for working the valves, " whereby the violent " strain and concussion " is avoided. Suitable feeding apparatus, consisting of a trough and moveable table, are employed for supplying the materials to be crushed. Stampers made of a single piece are used.

[Printed, 1*s*. 3*d*. See Mechanics' Magazine, vol. 57, pp. 89 and 118; Practical Mechanics' Journal, vol. 5, p. 232.]

A.D. 1852, January 30.—N° 13,940.

LONGMAID, WILLIAM.—"Improvements in obtaining gold." Auriferous minerals, as quartz, limestone, sand, clay, iron pyrites are fused with ferrugineous alkaline or earthy substances, and become fluid slag. The gold is then precipitated either by its density or its affinity for iron, calcined pyrites. Oxide of iron, lime, fluor spar, may be used for the fusing mixture. 50 parts, by weight, of oxide of iron, 50 of lime, and 100 of quartz, are suitable proportions to be employed. About 2 tons of crushed minerals may be fused at once in a suitable reverberatory furnace. When the charge is well fused the gold will mostly be precipitated by its density if it is held in suspension in the slag. Metallic iron, as old boiler plate, is introduced. The gold is precipitated on its surface; it is then plunged into a bath of melted lead; the gold combines with the lead, and is afterwards separated by cupellation.

[Printed, 3d. See Repertory of Arts, vol 20 (*enlarged series*), p. 367; London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 195; Mechanics' Magazine, vol. 56, p. 433, and vol 57, p. 133.]

A.D. 1852, February 3.—N° 13,956.

CLAUSSEN, PETER.—"Improvements in the manufacture of "saline and metallic compounds." These relate to a mode of obtaining saline compounds, as nitrate of potash, by treating ammonia in such a way that the volatile alkali may be decomposed and oxydised. "Nitracids are formed," which are presented to suitable bases, as lime, potash, or soda.

Caustic soda and carbonate of soda are formed by the simple or double decomposition of sulphate of soda, or chloride of sodium.

[Pinted, 3d. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 353; Mechanics' Magazine, vol. 57, p. 139.]

A.D. 1852, February 13.—N° 13,971.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—"Improvements in the manufacture, shaping, and coating of "metals, and in the means of applying heat." Slabs, or sheets rolled, extended, or beaten zinc are coated with lead, by heating them on a hot iron plate. When the heat is a little above the heat of melting lead, powdered sal ammoniac is sprinkled on the

surface, and it is rubbed with a stick of lead until a coating of lead is deposited. A sufficient quantity of molten lead is then poured thereon, its temperature not being too high, so as to melt the zinc. The zinc so coated with lead is allowed to cool, and may be rolled or otherwise extended. The zinc or its alloys may be coated by casting lead, or tin, or their alloys, around it. When placed in suitable moulds the surface of zinc can be cleansed with weak muriatic or other acid. Improved modes of stamping gutters and flutes are described. In coating the surface of one metal with another, as iron with zinc, a small quantity of powdered sal ammoniac and a considerable quantity of sand, or charcoal, or coke, or other suitable material, may be used as a flux to be placed on the surface of the molten zinc as a protecting stratum.

In coating iron with lead, a bath with a division bar across it may be used, the bottom of the bar being below the surface of the molten lead. The lead on one side of the division bar is covered with a layer of molten zinc. Through this the iron is dipped, and is passed under the bar, and is taken out through the lead on the other side "perfectly coated." Suitable flux, as sal ammoniac, should be used.

In coating wire or other surfaces with molten metal, the wire is drawn through the baths, and is made to issue through a tube or other confined passage, filled with a vapour or gas, as steam or carbonic acid, so that the air is excluded and oxydation is prevented.

[Printed, 7*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 216; Mechanics' Magazine, vol. 57, p. 177.]

A.D. 1852, February 23.—N° 13,987.

BOULTON, SAMUEL.—"Improvements in the treatment of "metallic ores and certain salts and residuary matters, and in "obtaining products therefrom." Chloride of zinc is produced from sulphate of zinc by dissolving the sulphate in water with any salt containing chlorine or muriatic acid. The zinc combines with the chlorine, the salt with the sulphuric acid forms a sulphate. The operation may be facilitated by applying heat to the solution. Ores containing zinc are calcined with any salt containing chlorine, "chloride of zinc, which sublimes from the heated mass," *is thus obtained*. Currents of steam or heated air may be

injected into the mass. Modes of producing sulphur and sulphuric acid from the salts and residuary matters containing them are described.

[Printed, 3*d*. See Mechanics' Magazine, vol. 57 p, 179.]

A.D. 1852, March 4.—N° 13,996.

TRUEMAN, Alfred, and CAMERON, John.—"Improvements in obtaining copper from ores." The "regulus or coarse metal" is obtained in from the copper ores in the usual way; it is ground, and if it contain material quantities of tin, antimony, or arsenic, it is boiled in a saturated solution of caustic alkali for about 6 hours. The solution is then drawn off, and may be used for treating further quantities of powder; the tin and antimony may be precipitated from it by diluting it with water. The powdered regulus, whether boiled or not, is calcined to drive off all, or nearly all the sulphur; an "artificial oxide" is thus obtained, which is mixed with the sulphuret ores. Minute directions and proportions are specified for various ores. A sufficient quantity of silica must be present to combine with the iron; the use of carbon is avoided.

[Printed, 4*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 239; Mechanics' Magazine, vol. 57, p. 236.]

A.D. 1852, March 8.—N° 13,997.

PARKES, Alexander.—"Improvements in separating silver from other metals." These relate first, to separating silver from lead; 2nd, from alloys of zinc and other metals. The specification of prior Letters Patent of June 11, 1850 (see No. 13,118, p. 177) is referred to. Lead containing silver is melted in a suitable vessel, and is poled with green timber in the ordinary way, and heated to the temperature of molten zinc; molten zinc is then mixed with the lead, in about the following proportions: to a ton of lead found by assay

To contain	14	oz. of silver add	22·4	lbs of zinc.
,,	21	,,	33·6	,,
,,	28	,,	44·8	,,

The mixed metals are allowed to cool, as they set zinc and silver rise to the surface and are removed by perforated ladles.

The zinc left with the remaining lead may be removed by

running the lead into a heated reverberatory furnace and keeping it at a dull red heat until oxydised zinc rises to the surface, the lead is then tapped out and poled with green wood.

The alloy of zinc, silver, and lead is concentrated by heating it to a moderate heat in perforated iron vessels and draining off as much lead as possible, it may then be oxydised by subjection to a low heat and digested in sulphuric or muriatic acid diluted 4 or 6 times their bulk of water.

Or it may be operated upon in closed retorts so as to separate zinc and leave the lead and silver to be treated by cupellation.

[Printed, 3*d*. See Mechanics' Magazine, vol. 57, p. 237.]

A.D. 1852, March 8.—N° 13,999.

GRAHAM, James.—" Improvements in treating ores containing " zinc and the products obtained therefrom." The specification and drawings describe furnaces for calcining and roasting zinc ores as blende or calamine in suitable pots. Suitable pipes, receiving chambers, valves, and other apparatus are described for collecting and condensing the metallic and other fumes. Processes used in manufacturing sulphuric acid and oxide of zinc are described.

[Printed, 10*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 351; Mechanics' Magazine, vol. 57, p. 238.]

A.D. 1852, March 8.—N° 14,013.

CUNINGHAME, Alexander.—" Improvements in the treat- " ment and application of slag or the refuse matter of blast " furnaces." The slag is granulated by running it into water and is then treated with sulphuric acid in a leaden cistern. Sulphate of alumina is obtained by dilution with water, and decantation and filtration to separate lime and silica, and pure solid sulphate of alumina is obtained by evaporation. Alum is obtained by adding potash or ammoniacal salts, and by crystallization. Sulphuric acid may be produced from the sulphate. By treating slag with muriatic acid chlorides are produced. The granulated slag may be used instead of lime for purifying pyroligneous acid.

[Printed, 4*d*. See Mechanics' Magazine, vol. 57, p. 239; Practical Mechanics' Journal, vol. 5, p. 157.]

A.D. 1852, March 8.—N° 14,014.

PIDDING, WILLIAM.—" Improvements in mining operations, " and in the machinery or apparatus connected therewith." Boring apparatus for making holes for blasting quartz and other rocks is described with drawings.

Hot and cold drills are proposed to be used. Fluxes suitable for being combined with gold ores are described, also methods of employing electricity for blasting operations.

[Printed, 7*d*. See Mechanics' Magazine, vol. 57, p. 239.]

A.D. 1852, March 24.—N° 14,040.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—" Improve- " ments in shaping, coating, and applying sheet metal to building " purposes." Sheet metal is made in different thicknesses being alternately thicker and thinner in parallel strips; these are corrugated.

Thick coatings of lead or tin, or their alloys, are given to zinc by employing " a pan or other suitable means to retain the molten " metal about the zinc in the process of dipping such zinc into " molten metal."

[Printed, 6*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 292; Mechanics' Magazine, vol. 57, p. 278.]

A.D. 1852, April 28.—N° 14,093.

RICHARDSON, THOMAS.—" Improvements in treating matters " containing lead, tin, antimony, zinc, or silver, and in obtaining " such metals or products thereof." These consist in modes of treating the oxide of lead which is produced in the process of softening the hard leads of commerce. The oxide of lead together with the oxides of other metals with which it may be combined or " the alloys of tin and copper, sometimes sold as waste pro- " ducts," are exposed to currents of hot air in a reverberatory furnace, and are employed in the place of litharge with acetic or nitric acid, and the same utensils which are used for the manufacture of acetate or nitrate of lead. The oxide of lead is dissolved out, and the oxides of tin or antimony are reduced to the metallic state in the ordinary way. For mixed oxides of tin and copper sulphuric acid is used.

The mixed oxides of lead and antimony may be ground and reduced with common alkali and carbon in a reverberatory furnace. About 20 cwt. of the oxides obtained in calcining the hard lead of commerce may be used with 28 lbs. of alkali and 112 lbs. of powdered coal.

The mixed metal is again calcined in an iron pan holding about 10 tons, and the mixed oxide of lead and antimony so produced, is ground and operated upon by lixiviation.

Lead ores are roasted at a dull red heat in a reverberatory furnace, having "five or six flats" from which the ores are gradually moved in succession from the flat farthest from, to that nearest to the fire bridge; the ores are never suffered to become pasty ,and in from 30 hours to five days the sulphur is all expelled, and the ores may be smelted in the usual way.

The impure oxides produced in smelting zinc ores are mixed with the waste oxides above mentioned, or with the slowly roasted lead ores, or with ground "grey slags," and combined with clay, are reduced in a furnace, which is described with the aid of drawings.

[Printed, 9*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 357; Mechanics' Magazine, vol. 57, p. 393.]

A.D. 1852, May 1.—No. 14,103.

PARKES, ALEXANDER.—"Improvements in obtaining and sepa-" rating certain metals." Gold is separated from lead or alloys of lead by fusing quartzose or other auriferous ores or materials with lead or compounds of lead, the lead serving as a bath and forming alloy of lead and gold.

To every ton of lead found by assay to contain—

10 oz. of gold,	22lbs. 4oz. of zinc	are added.
20 ,,	44lbs. 8oz.	,,
30 ,,	66lbs. 12oz.	,,

The alloy is kept at the heat of melting zinc, and the mixed metals are stirred and allowed to cool. The zinc and gold will rise to the surface, and may be removed by perforated ladles, and the lead may be drained from it, and it may then be operated upon the usual way to separate the gold from the zinc.

Instead of using mercury in the amalgamating process for separating gold and silver from their ores, lead and zinc are employed in connection with heat, five per cent. of chloride of

ammonium, or of zinc, or one per cent. of carbon may be used with one per cent of scrap iron, as described.

[Printed, 3*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 161; Mechanics' Magazine, vol. 57, p. 414, and vol. 58, p. 80.]

A.D. 1852, May 1.—N° 14,104.

PATTINSON, Hugh Lee.—" Improvements in smelting certain " substances containing lead." These relate to a mode of treating the residua obtained in manufacturing the pigment called " Pat- " tinson's oxichloride of lead," the subject of former Letters Patent (see *ante* N° 12,479, p. 165.)Four parts of the residue are fused with one part of granulated iron, or filings, or turnings of iron, and one of common salt, in a reverberatory furnace. The charge when fused is run into a conical iron vessel, the mass is cooled and the lead is detached from the slag, which afterwards " smelted in the slag hearth."

[Printed, 3*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 371; Mechanics' Magazine, vol. 57, p. 396.]

A.D. 1852, May 8.—N° 14,117.

MUNTZ, George Frederick, junior.—" Improvements in the " manufacture of metal tubes." An alloy of 60 parts copper, and about 38 parts good zinc is cast into the form of short tubes with an elongated oval section. These are washed inside with lime water saturated with salt, and are then heated and rolled flat and so elongated. The lime and salt prevent adhesion. The flattened tubes are afterwards again rolled, and are made cylindrical by the apparatus described with drawings.

[Printed, 1*s*. 6*d*. See Repertory of Arts, vol. 20 (*enlarged series*), p. 345; Machanics' Magazine, vol. 57, p. 416; Practical Mechanics' Journal, vol. 5, p. 235.]

A.D. 1852, June 24.—N° 14,187.

WALLIS, Charles James.—" Improvements in machinery for " crushing, pulverizing, and grinding stone, quartz, and other " substances." Crushing balls or spheres or discs are made to rotate in grooves between two tables, one or both of which is made to revolve on its axis or their axes. The ores are fed in from suitable feeding hoppers, and when crushed may be washed and amalgamated in the usual way.

[Printed, 11*d*. See Mechanics' Magazine, vol. 58, p. 37.]

A.D. 1852, July 6.—N° 14,198.

ROBERTS, MARTYN JOHN.—"Improvements in the production "of electric currents in obtaining light, motion, and chemical "products," &c., and the reduction of ores. These relate to processes and apparatus, described with the aid of drawings, for generating electric currents, and employing them in reducing ores and working metals. They are employed in such a manner that the compounds produced in the operations may be recovered and some of the materials be reconverted into their original state, and re-applied. Thus "when nitric acid is applied to a copper ore so "as to form nitrate of copper, and that nitrate is decomposed by "means of any suitable metal," a nitrate of the metal employed will be produced. This nitrate is again resolved into its component parts, acid and metal, and may be again employed. So when iron is used with sulphuric acid solutions of copper, the sulphate of iron is reduced to its elements, and made to yield sulphuric acid and iron. Other electrical apparatus, batteries, lights, motive power apparatus, &c., are described.

[Printed, 1s. 7d. See Mechanics' Magazine, vol. 58, pp. 41 and 56.

A.D. 1852, July 15.—N° 14,225.

RICHARDS, THOMAS, and GROSE, SAMUEL.—"Improvements in machinery for reducing and pulverizing ores, minerals, "stones, and other substances." The apparatus, described with the aid of drawings, consists of two reducing or pulverizing surfaces of case-hardened iron or steel. These are made to revolve with suitable shafts and bearings, which are adjustable so that an "opening or space" is provided between the surfaces "which "gradually tapers off or diminishes, till such surfaces approach "to, and nearly touch each other." Suitable pipes and apparatus are provided for supplying and carrying off water and waste.

[Printed, 9d. See Mechanics' Magazine, vol. 58, pp. 61 and 77.]

A.D. 1852, July 16.—N° 14,226.

HUNT, JOHN.—"Certain machinery for washing and separating "ores." Machinery for washing ores of the precious metals is described with the aid of drawings. A rectangular box is divided *into three* compartments; the water is supplied to the first, and

passes into the second or forcing chamber, whence it is injected into the washing chamber. Suitable valves and forcing apparatus are used for forcing the water "in sudden jerks through perforated " copper plates or sieves," and thereby " setting the ore or mine- " rals thereon in motion in such a way as to cause each kind of " ore or mineral to be separated according to its respective specific " gravity."

[Printed, 9d. See Mechanics' Magazine, vol. 57, p. 481, and vol. 58, p. 97.]

A.D. 1852, July 20.—N° 14,228.

SPARRE, JULIUS FRIEDRICH PHILIPP LUDWIG VON.—" Im- " provements in separating substances of different specific " gravities," &c. Apparatus for washing ores, gold sand, or coal, is described with the aid of drawings. The substances being of different specific gravities, are precipitated in a vessel containing water, which made to rotate rapidly, they are thereby separated and afterwards collected by means of horizontal partitions or shelves which intercept the same at different hights, while they are sinking in the water.

[Printed, 10d. See Mechanics' Magazine, vol. 58, pp. 81 and 98.]

A.D. 1852, July 31.—N° 14,247.

STARKEY, SAMUEL.—" Improvements in machinery for wash- " ing minerals and separating them from other substances." The machinery, which is described with the aid of drawings, is "in- " tended for use in what is called surface mining," that is, where gold and the precious metals are found not embedded in rock, but loose, and also for the general use of refiners, the object being to retain the minutest particles of metal, and to economise the use of water. A cylindrical vessel with the upper part curved outwards contains the water, through the centre of it passes a shaft on which suitable fans or paddles are fixed. The wide part of the vessel acts as a hopper, the earthy and metallic particles are precipitated into water, and are agitated by the paddles. Suitable openings and trays are connected with the lower part of the vessel, and the water is drawn off, and the metallic particles are separated from the earthy ones in the usual way."

[Printed 1s. 3d. *See Mechanics'* Magazine, vol. 58, p. 153.]

A.D. 1852, August 12.—N° 14,262.

BEKAERT, FRANCOIS BERNARD. — "Improvements in the "manufacture of zinc white."

[No Specification enrolled.]

A.D. 1852, August 26.—N° 14,280.

CROSSE, ANDREW.—" Improvements in the extraction of metals " from their ores." Currents of electricity are employed for separating copper from ores containing it. The copper ores are calcined and pulverised, and about 15lbs. of the pulverized ores are placed in a vessel of wood or earthenware, containing 230 quarts of water, and five quarts of sulphuric acid of commerce. A frame of reticulated platinum wire work (having inch meshes) is suspended in the vessel above the ores by a platinum wire covered with non-conducting substance (by preference heat resisting); the wire is connected with the positive pole of a battery, Daniel's is preferred, and should consist of about 20 pairs of plates. To the negative pole is connected a basin of wood, lined with sheet copper, and suspended in the solution by suitable wires; a copper wire netting (having inch meshes) covers the basin, and is connected with the conducting wire. The solution is by preference heated by suitable sand baths. The battery being charged, copper is by electric agency separated from the ores and deposited as powder in the suspended basin. The metallic residuum may, if requisite be recalcined, and be again operated upon.

[Printed, 6*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 235; Mechanics' Magazine, vol. 58, p. 216.]

A.D. 1852, September 18.—N° 14,295.

MICHELL, JOHN.—" Improvements in purifying tin ores, and " separating ores of tin from other minerals." Common salt is mixed with tin ores, which are stamped and washed, and subjected to, as nearly as may be, 163° (of Daniell's pyrometer) degrees of heat in a reverberatory furnace. The proper proportion of salt is ascertained by taking one or more samples of tin, and exposing them with one or two ounces more or less of salt to 163° of heat for about three quarters of an hour; on throwing the samples into water and analysing the oxides of tin produced, that sample which

produces pure oxide of tin is combined with the proper proportion of salt.

The oxide of tin is smelted, and treated in the ordinary way.

[Printed, 3*d*. See Repertory of Arts, vol. 21 (*enlarged series*), p. 228.]

A.D. 1852, October 7.—N° 14,315.

ANDREWS, Solomon. — " Improvements in machinery for " cutting, punching, stamping," &c., " and to crushing and pul- " verising ores and other hard substances." The machinery consists of a hammer or stamper, moved up and down vertically in guides. It has suitable adjusting and regulating apparatus, which is described with the aid of drawings, and may be used for crushing ores.

[Printed, 10*d*.]

A.D. 1852, October 23.—N° 14,336.

SHRAPNEL, Henry Needham Scrope.—" Improvements in " extracting gold and other metals from minerals and earthy " substances." The ores, minerals, or other substances are to be pulverised by placing them in a cannon and discharging them against a hard iron, or other surface. Gunpowder, steam, or other propelling force may be employed.

[Printed, 3*d*. See Mechanics' Magazine, vol. 58, p. 125.]

A.D. 1852, November 11.—N° 14,344.

WEEMS, John.—" Improvements in the manufacture or pro- " duction of metallic pipes and sheets." Various arrangements of machinery are described with drawings for making pipes and tubular articles, and sheets from block tin, lead, copper, and their alloys. Direct pressure is applied, which causes " exudation of " the treated metal through a suitable orifice."

[Printed, 10*d*.]

A.D. 1852, November 13.—N° 14,346.

PETRIE, William.—" Improvements in obtaining and applying " electric currents, and in the apparatus employed therein, part or " parts of which improvements are applicable to the refining " certain metals, and the production of metallic solutions, and of

"certain acids." The specification and drawings, which should be referred to, describe the improvements under 20 heads. They refer to a particular form of cell, called a solution cell, having a projecting lip, and to modes of employing solution cells, on a "differential system," and in treating metallic substances in acid solutions. Improved syphons, and galvanic batteries, and magneto-electric machines are described.

[Printed, 1*s.* 4*d.*]

AD. 1853, March 21.—N° 14,358.

GIBBS, Joseph.—"Improvements in the treatment of metals, "and metalliferous ores." Grinding apparatus is described with drawings, it consists of two stones or iron discs, like those used in cement mills, but stronger. The ground ores are separated and assorted by means of sifting and bolting machines, and are washed in a separating vessel wherein "water or air is applied to "give an upward action to the water so as to cause the materials "to be separated and arranged according to their specific "gravities." Blowing and winnowing machines are used. The pulverised metallic substances containing gold or silver are "in-"jected with air through mercury so as to form an amalgam." Mills fixed in iron cases similar to those used for grinding corn, or oil paints, are employed for grinding the mercury, and amalgamated mineral substances.

[Printed, 1*s.* 11*d.*]

PATENT LAW AMENDMENT ACT, 1852.

1852.

A.D. 1852, October 1.—N° 28.

POOLE, Moses.—"Improvements in coating metals and other "substances with a material not hitherto used for such pur-"poses."—(*Communicated from Mr. Goodyear, from America.*)

Metals are coated with a compound of india rubber and sulphur. Heat is applied to the compound, which becomes the hard substance known as "vulcanized india rubber."

[Printed, 2½d.]

A.D. 1852, October 1.—N° 42.

HEDLEY, OSWALD DODD.—" Improvements in getting coal " and other minerals." The tool or cutters used in excavating minerals is attached to a carriage running on a railway in the shaft or mine.

Adjusting apparatus for setting out the tool to the required extent is described.

[Printed, 5½d.]

A.D. 1852, October 1.—N° 48.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—" Im-" provements in rolling metals." Two or more pairs of rollers are employed in succession " in the extension or flattening of " iron, zinc, lead, tin, copper, or the alloys of these metals, so " as to get through more work, or to obtain a combination of " the advantages of rolling and drawing."

A flatter surface is given to the sheets. The metals, when requisite, should be rolled hot.

[Printed, 2½d.]

A.D. 1852, October 1.—N° 49.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—" Im-" provements in coating metals." Thin sheets of lead are combined with plates of zinc by heating the metals and passing them through rollers.

Sheets of iron which have been prepared for being coated with metals or alloys by cleansing them with acids, are immersed in hot sand mixed with sal ammoniac to protect them from oxydation.

In coating metals, three rollers may be used; they are immersed in the bath; the plates descend into the bath on one side of the middle roller, and ascend on the other.

[Printed, 5½d.]

A.D. 1852, October 1.—N° 83.

OMMANNEY, HENRY MORTLOCK.—" An improved furnace for " melting of metals in crucibles." The furnace has three or four compartments called coke chambers, and one of them called a crucible chamber, containing the crucible. Into this the flues from the coke chambers are conducted; the crucible is thereby heated without its being in direct contact with the burning coke.

[Printed, 2½*d.*]

A.D. 1852, October 1.—N° 104.

ROBERTS, MARTYN JOHN.—" Improvements in the manufac- " ture of oxides of zinc and tin." Zinc alone or combined with sulphur is placed in a suitable furnace or vessel and heated to a high temperature. Currents of steam or heated air are passed over or through the molten zinc to produce oxide of zinc. Metallic tin is operated upon in a similar way.

[Printed, 2½*d.*]

A.D. 1852, October 1.—N° 134.

OMMANNEY, HENRY MORTLOCK.—" An improvement in the " manufacture of stamp heads for crushing ores." The stamp head is made of cast iron in the usual way. It is then placed in an annealing furnace, and the metal becomes decarbonized and partially malleable. The stamp heads are thus rendered more tough and durable.

[Printed, 2½*d.*]

A.D. 1852, October 1.—N° 144.

SEATON, WILLIAM.—" Improvements in the construction of " iron vessels and in sheathing or covering the same." The plates of iron are arranged end to end and rivetted to plates or strips of metal which join and hold the plates together.

The plates are covered with planking, felt being inserted between it and the iron side, and sheathing of copper or its alloys is fastened on the planking.

[Printed, 5½*d.*]

A.D. 1852, October 4.—N° 205.

BILLING, Martin, and STREET, Charles Henry.—"Im-"provements in the combination of metals," &c. Domestic articles, as curtain poles, are formed of a combination of metals, so as to avoid the ringing metallic noise caused by striking or moving them. This is effected by placing the hard metal, as brass outside, and using an inelastic soft metal inside or as a lining.

[Printed, 2½d.]

A.D. 1852, October 7.—No. 290.

HORSFIELD, William.—"Improvements in splitting, crush-"ing, and grinding corn, &c., and minerals." Two grinding stones or surfaces are used, both being in a vertical position, and one of them stationary. The running stone revolves on a horizontal axis. Suitable apparatus for feeding and removing the materials is described.

[Printed, 6½d.]

A.D. 1852, October 7.—N° 29 .

TRUEMAN, Alfred.—"Improvements in obtaining copper "and other metals from ores or matters containing them." Oxide ores of copper or calcined sulphurets are digested in acids, and muriate of lime or lime is afterwards applied to cause precipitation. If sulphuric acid be used the copper is dissolved, sulphate of silver is left and is washed out by hot water, and added to the sulphate of copper drawn off. Common salt or muriatic acid is added thereto; silver is thrown down as chloride. The solution of sulphate of copper is run off, muriate of lime is added, muriate of copper is formed, and run off, sulphate of lime is precipitated. Lime is added to the muriate of copper, throwing down oxide of copper, leaving muriate of lime in solution, which may be again used. The oxide of copper and chloride of silver are treated in the usual way. Directions are given for obtaining the oxide of tin that may be left in the residual solutions or deposits, also for using muriatic or nitric acid.

[Printed, 3½d.]

A.D. 1852, October 12.—N° 344.

PERKES, Samuel.—" Improvements in certain apparatuses and " machines for the production and treatment of mineral and other " substances," &c. These relate to boring, crushing, sifting, washing, separating, and amalgamating apparatus for operating upon quartzose and other ores, especially those of the precious metals. They are described under twenty-six heads. The boring bar is made in joints, and hollow so as to admit water to the chisel point.

[Printed, 11½*d.*]

A.D. 1852, October 15.—N° 401.

NEWTON, William Edward.—" Improvements in washing " and amalgamating gold and other metals."—(*A communication from Abiather Potter, U. S.*) The specification and drawings describe apparatus for forcing pulverised auriferous ores in " a " diffused and agitated state through a mass of quicksilver by the " pressure of a column of moving water, or other equivalent " pressure." Gold or other precious metal is separated by the amalgamating process. The lighter particles rise to the surface of the heavier ones, and are collected and removed.

[Printed, 6½*d.*]

A.D. 1852, October 18.—N° 427.

BELLFORD, Auguste Edouard Loradoux.—" Improve- " ments in the manufacture of fuel," &c., and " freeing metals " from extraneous shbstances."—(*A communication.*)—*Provisional Protection only.* These are stated to consist in three processes for rendering certain matters, as metallic ores and earths, combustible by pulverising them and mixing them with vegetable or other combustible bodies, and drying or heating them in kilns. The prepared bodies are then treated by suitable processes for recovering the metallic matters they contain.

[Printed, 3½*d.*]

A.D. 1852, October 18.—N° 433.

McLeod, John Lyons.—" Improvements in giving a metallic " coating to iron ships' bottoms and other surfaces."—*Provisional Protection only.* The ship's side is coated with marine glue or

other suitable composition, and then plates, sheets, or leaves of metal or alloy are laid thereon and attached thereto by the adhesive coating.

[Printed, 2½d.]

A.D. 1852, October 19.—N° 442.

NEWTON, William.—"An improved machine for separating " ores, metals, and other heavy substances substances from mud, " sand, gravel, stones, and other impurities."—(*A communication.*) A shallow vessel of metal with sides inclining outwards is used. It is nearly filled with water. Auriferous or other metallic earth is put therein and well stirred. The vessel is then made to rotate rapidly and all the lighter particles are thrown off by centrifugal action; the heavier ones separate themselves, and sinking are caught by suitable conductors.

[Printed, 5½d.]

A.D. 1852, October 21.—N° 468.

THOMAS, Alexander.—"Improvements in the treatment and " welding of metals by certain chemical combinations."—*Provisional Protection only.* The metallic surfaces required to be joined are heated to a red heat, and are brought into contact; a combination of borax, sal ammoniac, prussiate of potash, and rosin being interposed. When the metals cool, they unite."

[Printed, 2½d.]

A.D. 1852, October 22.—N° 490.

HOGA, Stanislaus.—"Improvements in separating gold from " the ore." The auriferous ores are moistened with a solution of muriate of ammonia, and fluid mercury is added. The mass is transferred to a cylinder having a perforated bottom, pressure is applied by a piston, and the auriferous amalgam is pressed out, leaving earthy particles behind. The amalgam is treated in the usual way. A U-shaped tube is used as a washing vessel. The shorter arm has a lip bending inwards, and in its centre a rod carrying fans is made to revolve. Water is poured into the longer arm, earthy matters are placed in the shorter arm, are stirred up by the fans, and carried off by the water, leaving the heavier metallic deposits.

[Printed, 2½d.]

A.D. 1852, November 1.—N° 605.

STENSON, George.—"Improvements in apparatus for sepa-"rating gold from auriferous sand and earth."—*Provisional Protection only.* The auriferous earths are to be washed in an inclined vessel. Streams of water are supplied to the vessel by suitable pipes. Stops or bridges are fixed in the vessel, and as the stream of water carries down the earthy matters, the heavy metallic particles are arrested by the stops, and are collected in suitable recesses, while the lighter are carried over and washed away.

[Printed, 4½*d.*]

A.D. 1852, November 2.—N° 614.

ARCHIBALD, Charles Dickson.—"Improvements in ma-"chinery and apparatus for grushing, grinding, and triturating "refractory and other materials, and for washing and separating "ores and metals from earthy and other substances."—(*A communication.*)—*Provisional Protection only.* The griding is proposed to be accomplished by balls rotating in circular grooves in suitable vessels, the pressure being increased, if requisite, by superimposed weights. The metallic earths are washed in suitable circular rotating vessels, and the heavy metallic particles are separated by centrifugal action.

[Printed, 2½*d.*]

A.D. 1852, November 6.—N° 664.

PHILLIPS, John Arthur.—"Improvements in purifying tin." Tin is purified by running it, when in a molten state, into water. The tin so granulated is dissolved in muriatic acid (by preference hot), tungsten, or other foreign matter is deposited. The liquor is drawn off, and the tin precipitated by zinc, and may be washed, and pressed into ingots. The chloride of zinc is treated with lime, and zinc white may be thereby obtained. If copper be present in the first solution it is separated by iron.

[Printed, 3½*d.*]

A.D. 1852, November 8.—N° 679.

HOGA, Stanislaus.—"An instrument for ascertaining the "existence of gold in the earth."—*Provisional Protection only.*

The provisional states that a rod of some conductor of electricity is to be inserted in the earth, wherever gold is supposed to be, " and the presence of that metal will be immediately indicated " by the completion of the electric circuit."

[Printed, 2½d.]

A.D. 1852, November 12.—N° 728.

STENSON, George.—" Improvements in apparatus for sepa-" rating gold from auriferous sand and earth."—The auriferous earths are washed in a perforated tray fixed in suitable framing. The particles fall through upon an inclined wire sieve, made to vibrate vertically by suitable cam motions. The heavier metallic particles are allowed to drop through the sieve, the lighter ores are washed away.

[Printed, 4½d.]

A.D. 1852, November 17.—N° 772.

BELL, Isaac Lowthian.—" Improvements in the treatment of " certain compounds of iron and sulphur." Soda makers' tank residuum, consisting principally of sulphur and lime, with sulphur more or less united to calcium, is smelted in a blast furnace with burnt pyrites, or other oxide of iron, and sulphuret of iron is produced. Clay or burnt bricks are added. The proportions recommended are as follow:—

Moist tank residuum for the vats	3	parts	by weight.
Burnt pyrites - -	3	"	"
Clay or burnt bricks -	1	"	"

[Printed, 3½d.]

A.D. 1852, November 20.—N° 806.

DRAY, William.—" Improvements in machinery for crushing, " bruising, and pulverizing." Machinery for crushing metallic ores as auriferous quartz is described with drawings. It consists of one or more tilt hammers, fixed in suitable frames, and actuated in the ordinary way. The materials to be crushed are placed on anvils with slightly concave faces.

[Printed, 8½d.]

A.D. 1852, November 23.—N° 835.

BARKER, John.—"Improvements in separating gold from "quartz or matters containing that metal.—*Provisional Protection only*. The quartz, or other auriferous materials, are to be crushed and amalgamated with quicksilver, with or without salt, in a barrel or revolving vessel, having internal projections. From this the matters are run into a hopper, and are shaken and mixed; from the lower part of the hopper they fall into a perforated trough, and are washed or otherwise treated.

[Printed, 2½*d*.]

A.D. 1852, December 3.—N° 951.

WALL, Arthur.—"Improvements in preparing sheet metal for "shipbuilding and other uses."—*Provisional Protection only*. Sheet of iron or copper, or its alloys, are prepared by dipping them in suitable amalgams. For iron, copper, or tin and arsenic. and mercury or solutions of salts of mercury are used. Copper and "yellow metal" sheets may be first coated with mercury, then be dipped in the arsenic solution.

[Printed, 2½*d*.]

A.D. 1852, December 11.—N° 1032.

MORRIS, Timothy and JOHNSON, William.—"Improve-"ments in depositing alloys of metals." These consist in the employment in the electro process of solutions composed of cyanide of potassium and carbonate of ammonia, to which are added cyanides, carbonates, or other compounds of metals, in the proportions in which they are required to be deposited. To deposit brass alloy, mix with a gallon of water 1 lb. of the carbonate of ammonia of commerce, 1 lb. of cyanide of potassium, 2 oz. of cyanide of copper, 1 oz. of cyanide of zinc, to form the required solution. Or with the carbonate of ammonia and cyanide of potassium solution, employ a large sheet of brass as the anode or positive electrode of a powerful galvanic battery or magneto-electric machine; a small piece of metal is used for the cathode from which hydrogen gas must be freely evolved. The solution may be used cold, but is preferable to heat it up to 212° F. For

wrought or fancy work 150° F. will give good results. By continuing the process any thickness of deposit is obtained. If copper be deposited too freely, and the deposit becomes red, this may be corrected by adding carbonate of ammonia, or by reducing the temperature of the solution, which will bring down more zinc. If the deposit becomes too pale zinc comes down too freely; this is corrected by adding cyanide of potassium, or by raising the temperature, which will bring down copper more freely. To deposit German silver cyanides of nickel, copper or zinc may be added to the solution, or, by preference, a plate of the metal is made the anode or positive electrode of the battery. Alloys of gold, silver, and other metals may be deposited by employing similar processes.

[Printed, 3½*d.*]

A.D. 1852, December 11.—N° 1035.

GRIFFIN, CHARLES.—"Improvements in obtaining metallie "copper from its solutions formed by nature, and in the various processes of purifying cupreous ores by means of water."—*Provisional Protection only.* The invention is stated to consist in the application of an electrical current to obtain metallic copper, by depositing it on metallic surfaces, either from natural solutions or in the various processes of purifying and washing the ores or other compounds of copper.

[Printed, 2½*d.*]

A.D. 1852, December 14.—N° 1053.

BAGGS, ISHAM.—"Improvements in obtaining or extracting "gold and silver from their ores." The ores are crushed and then amalgamated with mercury, and washed in sieves, having meshes of copper, or other metallic wire, which are mercurialized as often as may be found requisite, by dipping them in a solution of nitrate, or other suitable salt, of mercury. The sieves are fixed in a frame, and suitable vibratory motions are given thereto.

The refuse and amalgam are received in a vessel, called a separator, which has sieves with mercurialized meshes, which act like strainers, and retain the earthy particles, while the amalgam and precious metals pass through.

[*Printed, 5½d.*]

A.D. 1852, December 15.—N° 1066.

ROTSCHEFF, Alexandre.—" Improvements in machinery or " apparatus for separating gold or other valuable substances from " earth or other extraneous matters."—*(Partly a communication.)* —*Provisional Protection only.*

The auriferous substances are washed in a vessel with a perforated bottom.

An instrument, like a rake or harrow, supported on wheels and working on rails or guides, is used for stirring up the deposits.

[Printed, 2½*d.*]

A.D. 1852, December 15.—N° 1067.

WALLIS, Charles James.—" Improvements in machinery for " amalgamating, mixing, and grinding substances together." Crushing, grinding, and mixing machines are described with the aid of drawings. Spheres, balls, or discs are made to revolve in annular grooves on a table or disc, while another table bears upon them above. The balls or discs may be connected with arms radiating from a central shaft.

Suitable feeding hoppers, and drawing off troughs and amalgamating apparatus, are described.

[Printed, 6½*d.*]

A.D. 1852, December 15.—N° 1069.

TAYLOR, Richard, and PHILLIPS, John Arthur.—" Im" provements in treating zinc ores."—*Provisional Protection only.* Sulphur ores of zinc are dissolved in muriatic acid, or are calcined and dissolved in sulphurous acid. Zinc is to be thrown down from the solution by the use of lime.

[Printed, 2½*d.*]

A.D. 1852, December 28.—N° 1183.

JUNOT, Claude Joseph Edmée.—" Improvements in the " mode of reducing several metallic substances hitherto unused, " and applying them so prepared to the plating of our metals and " substances by means of electricity." Tungsten, silicium, molybdenum, chromium, and titanium are prepared by dissolving *tunstic, silicic,* and molybdic acids in a boiling solution of carbonate

of soda; chromium being obtained "by double chloride of soda "and ammonia;" titanium, by dissolving in sulphuric acid and evaporating, and dissolving with sulphate of soda and ammonia in water. The metals are deposited from the solutions by the electro process.

[Printed, 3½*d.*]

A.D. 1852, December 29.—N° 1196.

POWER, JAMES.—"Silvering all sorts of metals and glass." Resinous matters are used in forming solutions of silver for silvering surfaces by the electro process.

The solution is thus formed:—an oz. of crystallized nitrate of silver is dissolved in twice its weight of water, "add 9½ per cent. "of nitrate of liquid of ammonia, add 6 times, by weight, of "nitrate of silver of alcohol," agitate the mixture and measure it, add 85 per cent. of "liquid of resinous spirit" (composed of 1 part of resinous matter and 5 parts of spirits of wine), gum galbanum is used by preference. Leave the solution to settle, then filter, add 9 times its weight by spirits of wine, then 8 per cent. of liquid ammonia, and finally, "spirits of wine equal to "what the liquid measures."

[Printed, 4½*d.*]

A.D. 1852, December 29.—N° 1197.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—"Improve-"ments in machinery for grinding and reducing gold quartz," &c., and generally to "pulverizing and washing of ores."—(*A communication.*) Stampers mounted in suitable frames are used for crushing the ores, below these are a number of basins revolving in an inclined position, each having a ball revolving loosely therein. The crushed ores fall from the trough in which they are pulverized, through a sieve, and spouts into the basins, and are there amalgamated with quicksilver. The water used in the stamping trough may be made to flow over into the basins.

[Printed, 8½*d.*]

A.D. 1852, December 31.—N° 1209.

SMITH, THOMAS BENJAMIN.—"Improvements in calcining "certain ores and in the construction of furnaces for that pur-

"pass," &c. Sulphuret ores are calcined in closed vessels or retorts, instead of being exposed to the direct action of fuel in combustion. The closed vessels are connected by flues or pipes with a condensing chamber wherein sulphuric acid is produced. Heated air is blown into the closed vessel and "keeps "up the combustion of the sulphur contained in the ores."

[Printed, 3½d.]

1853.

A.D. 1853, January 6.—N° 35.

CHAMEROY, EDME AUGUSTIN.—"A new composition of "different metals or metallic substances." Iron or other metal which is difficult of fusion, is disintegrated by pounding it or otherwise reducing it. It is then incorporated with other metals or alloys that are easily fusible as tin, zinc, or bismuth.

The fusible metal is melted and about 4 parts of pounded iron, steeped in a solution of ammonia or chlorine are added thereto and mixed therewith, forming a compound metal that may be cast in moulds or rolled.

[Printed, 3½d.]

A.D. 1853, January 6.—N° 37.

SMITH, MICHAEL.—"Improvements in machinery for separating "gold or other valuable substances from other materials."—*Provisional Protection only.* Two perforated cylinders are proposed to be used. One rotates inside the other, and each is provided with suitable fans or beaters. The auriferous earth is placed inside the inner cylinder, and washed with water, the metallic and finer particles pass through the perforations of the inner cylinder, are agitated and washed in the space between the inner and outer cylinders, and the finest and heaviest particles pass through a sieve in the outer cylinder.

[Printed, 2½d.]

A.D. 1853, January 8.—N° 55.

ABRAHAM, JOHN.—"A new or improved method of manufac-"turing percussion caps." Sheets of copper or other metals

are cut by stamping machinery into blanks or shapes like a rectangular cross, each blank exactly fits the contiguous one so that there is no loss of metal.

[Printed, 7½*d.*]

A.D. 1853, January 10.—N° 68.

NEWTON, ALFRED VINCENT.—"An improved mode of sepa-"rating substances of different specific gravities."—(*A communication.*) Copper ores are separated "from gangue and other mineral "and earthy substances of less specific gravity," by washing them in a pan, having a wire cloth for its bottom. Suitable vibratory motion is given to the pan by crank motions. As the pan is lowered into a vessel of water, jets of water pass up through the meshes of the bottom, and separate the earthy from the metallic substances; and the currents induced by the vibratory motion of the pan separate the heavier metallic particles from the lighter substances.

[Printed, 5½*d.*]

A.D. 1853, January 14.—N° 102.

BRAMWELL, FREDERICK JOSEPH, and BAGGS, ISHAM.—"Improvements in steam machinery used for driving piles, ham-"mering, stamping, and crushing." Apparatus for crushing ores is described with the aid of drawings. A steam engine in which the steam is first used on a small piston surface and then expansively on a layer is employed. A fixed steam cylinder may be conveniently used with hollow piston rod of considerable diameter, to which the stamper or crusher is attached. The steam valve "is constructed to admit the steam below the piston to lift it, and "then to open a passage for the steam to act upon the larger "area of the piston above, to cause the instrument to descend to "do its work."

[Printed, 7½*d.*]

A.D. 1853, January 18.—N° 121.

BROWNING, HENRY.—"Improvements in preparing compo-"sitions for coating iron and other ships' bottoms and other "surfaces." A coating is formed of white or red lead without

oil, black lead, and sugar of lead, with gum copal dissolved in spirits of turpentine. This forms the first coating; in the subsequent coatings the quantity of sugar of lead is to be reduced.

[Printed, 2½d.]

A.D. 1853, January 28.—N° 217.

KINGSTON, James Pope.—" Improvements in combining " metals for the bearings and packings of machinery." An alloy consisting of copper 9 lbs., tin 24 lbs., is first melted, when cooled it is re-melted, and 108 lbs. of tin are added thereto and melted; then 9 lbs. of mercury are added, and the whole combined. When cooled, it is ready to be used for bearings or packings of machinery.

[Printed, 2½d.]

A.D. 1853, January 29.—N° 233.

SPRING, Marcus.—" Improvements in apparatus for separating " gold from matter mixed or combined therewith."—(*A communication from Arnold Buffum, of New York.*) A washing and amalgating vessel and suitable fans and beaters are dscribed with the aid of drawings. An oblong vessel is divided into compartments by partitions, reaching nearly to the bottom; agitators revolve one in each compartment, and the bottom is covered with quicksilver. Auriferous earths are introduced and passed from compartment to compartment, being washed with water and agitated in each until the earthy matters are driven out at one end of the the vessel, leaving the gold amalgamated with the quicksilver.

[Printed, 5d.]

A.D. 1853, January 29.—N° 235.

BATCHELOR, Henry.—" Improvements in combining metal " plates for ship building and other engineering constructions." —*Provisional Protection only.* The plates are of metal, are to be laid one upon another, in two or more thicknesses, " crossing " each other at right angles, or at some other intermediate angle." The plates are then rivetted together, forming duplex or triple plates.

[Printed, 2½d.]

A.D. 1853, February 5.—N° 322.

MASSONNET, André Michel.—" Improvements in alloys of " metal, and of other substances, and also in the application of " the same to various useful purposes." An alloy resembling gold is formed by melting together copper dust or filings, 5 oz.; burnt calamine or zinc, $12\frac{1}{2}$ oz.; bitartrate of potash, 10 oz.; hydrochlorate of ammonia, 5 oz.; quicklime, $1\frac{1}{4}$ oz. After heating the compound for about six hours, until it becomes liquid, it is poured into a mould, and the ingot may be afterwards remelted with pure copper or silver to imitate gold of 18, 20, or 22 carats. An inferior alloy may be made by mixing calcined tartar, 4 lbs.; peroxide of zinc, 2 lbs.; hydrochlorate of ammonia or nitrate of potash, $2\frac{1}{2}$ oz.;—these are pulverized and thrown upon 20 lbs. of copper in a state of fusion, and mixed therewith; then 6 lbs. or more of zinc may be added.

[Printed, $2\frac{1}{2}$*d.*]

A.D. 1853, February 5.—N° 326.

PARKES, Alexander.—" Improvements in the separation of " certain metals from their ores or other compounds." Silver ores, which contain from 100 to 500 oz. of silver to the ton of ore, are mixed with about 4 cwt. of sulphuret of iron (by preference, prepared by gasing iron pyrites with lime), and 2 to 3 cwt. of oxide of iron (hematite may be used), and the same quantity of carbon; the materials are well pulverised, and mixed, and fused. If the mass is difficult of fusion, 2 cwt. of fluor spar are added. A silver reguline is obtained, which is tapped into water, and may be calcined, ground, and fused with 1 cwt. of lime, and 2 or 3 cwt. of granulated lead or oxide or sulphuret of lead. The lead and silver are separated in the usual way. Gold ores may be similarly treated with oxide of iron. Or with a ton of gold or silver ores, 3 to 4 cwt. of sulphate of lime or baryta may be fused with 2 cwt. of carbon and 2 cwt. of oxide of iron. Rich silver ores are well calcined and fused with 6 cwt. of oxide of iron, 3 cwt. of carbon, and 2 cwt. of fluor spar or lime. With 1 ton of gold ore, 1 cwt. of granulated metallic iron, 3 to 4 cwt. of oxide of iron, 2 cwt. of carbon, and 2 cwt. of lime may be fused. The iron

is afterwards dissolved out by acids. Sulphuret and arsenical compounds of nickel or cobalt are fused with gold and silver ores in proportions as 1 to 3, with carbon and lime as a flux.

[Printed, 3½*d.*]

A.D. 1853, February 7.—N° 332.

TABBERNER, JOHN LONDE.—"Improvements in the mode of "smelting iron and other ores," &c.—*Provisional Protection only*. The metals and ores are to be reduced to a powder before they are smelted in the furnace. Any convenient process of pulverising may be employed.

[Printed, 2½*d.*]

A.D. 1853, February 12.—N° 373.

PARRY, GEORGE.—"Improvements in blast furnaces."—*Provisional Protection only*. It is proposed to construct furnaces for melting metals with a skeleton tube or framing, suspended or supported in its interior.

It is covered with a suitable covering, which prevents the fuel falling into it, and is intended to prevent the furnace from becoming choked, and so enables the blast to be evenly distributed through the charge.

[Printed, 2½*d.*]

A.D. 1853, February 12.—N° 374.

BURSILL, GEORGE HENRY.—"Improvements in operating "upon auriferous quartz, clays, and other minerals," &c. Hard substances containing gold, as ores mixed with silica or quartz, are to be heated red hot, and precipitated into caustic ley. The ley when saturated with silica, may be purified by treating it with carbonic acid gas or lime.

Softer minerals, as alumina and gold, are treated with diluted acids, which dissolve alumina or lime, and gold is recovered by a washing process.

Pulverised auriferous ores are worked with an amalgam, consisting of bismuth 16 parts, tin 6 parts, lead 10 parts, mercury 5 parts, at a temperature lower if requisite, than that of boiling

water. The pulverised auriferous substances are agitated in a cylindrical vessel, provided with fans or beaters, set radially in a vertical shaft at different elevations, or at such an angle that the substances are pressed gradually down, and forced into among the amalgam or amalgamating compounds.

[Printed, 4½*d.*]

A.D. 1853, February 15.—N° 388.

BETHELL, John.—" Improvements in obtaining copper and " zinc from their ores."—(*A communication.*) The ores are finely crushed, and mixed according to the quantities of sulphur they contain, and are roasted slowly in a reverberatory furnace. A free current of air is admitted, but the flame does not act directly upon the ores, which are well stirred during the roasting process, which lasts about 2 or 3 hours. Sometimes about 20 per cent. of small coal mixed with sulphuretted ores may be added with advantage. After being roasted, the mixture is withdrawn, and placed in a tank of stone or wood, and to it about 4 parts of boiling hot sea or salt water are added, so as to dissolve the sulphate of copper formed by the roasting process. The solution is drawn off, and treated with slaked lime, oxide of copper is precipitated, and is reduced to metallic copper in the ordinary way.

Zinc is made from its ores by a similar process. Sulphuric or muriatic acids may be used for converting oxides of zinc into sulphates or chlorides.

[Printed, 3½*d.*]

A.D. 1853, February 16.—N° 401.

CUTLER, Job.—" Improvements in the manufacture of spoons " and forks," &c. The articles are cast in iron or brass, or German silver, or other metals or alloys, and are afterwards coated with gold, silver, or alloys by the electro process.

[Printed, 6½*d.*]

A.D. 1853, February 17.—N° 421.

WATT, Charles, and BURGESS, Hugh.—" Improvements " in coating iron with copper and brass." Sheets or bars of iron are coated with a solution of cadmium or zinc, then dried and

dipped in a bath of melted copper or brass or other alloy, then raised out of the bath into an atmosphere of steam and carbonic acid flowing-in in jets.

Rollers may be used for raising the sheets from the bath, and equalizing the surfaces.

[Printed, 3½*d.*]

A.D. 1853, February 18.—N° 426.

DARLING, WILLIAM.—" Improvements in the manufacture of " malleable iron and other metals."—The specification and drawings describe rolling machinery for " rolling iron and other metals " as copper and brass." The actuating engine is made to work at a higher speed than the rolls, which " will give a steadier and " more efficient rolling."

Furnaces for working metals are disposed in the plan of a semi-circle, having flues which converge to a main chimney or shaft.

The heat of the flues may be employed to heat steam boilers, or be otherwise applied. Moveable furnace bars, such as those known as Bodmer's and Jucke's bars, may be employed.

[Printed, 6½*d.*]

A.D. 1853, February 19.—N° 433.

COWPER, CHARLES.—" Improvements in the manufacture of " oxide of zinc," &c.—(*A communication.*)—*Provisional Protection only.* It is proposed to use a furnace containing a series of retorts placed in an inclined position, and provided with apertures near their mouths for admitting air, and other apertures through which oxide of zinc passes into a condensing chamber. The retorts are charged with metallic zinc or zinc ores.

[Printed, 2½*d.*]

A.D. 1853, March 4.—N° 553.

STIRLING, JOHN DAVIE MORRIES. — " Improvements in " manufacturing coated metal." — *Provisional Protection only.* Metals that have been coated by electrical or chemical action are to be subjected to a rolling process, which reduces the thickness and planishes the surfaces of the metals.

[Printed, 2½*d.*]

A.D. 1853, March 8.—N° 582.

SCHMITT, Nicolas. — "Improvements in cleansing and "separating ores and coal." The ores are crushed and dried, and sifted, and then are exposed to the action of a blowing machine. The particles are cleansed thereby, and, being separated according to their respective specific gravities, are made to fall in separate divisions, or receptacles.

[Printed, 9½d.]

A.D. 1853, March 8.—N° 587.

EMERSON, Frederick William.—"Improvements in ob- "taining tin from ores." Ores of tin are digested, with or without the aid of heat, in a mixture of common salt and sulphuric acid, to which nitrate of soda or potash may be added. The ores, if necessary, are calcined. Oxides of tin are "peroxi- "dised" by wetting them "with nitrous or nitric acid" allowing a few hours to elapse, they are then evaporated to dryness in a retort. The nitrous fumes are condensed in a suitable condenser. The prepared ores are mixed with as much common salt as shall yield enough muriatic acid, on being treated with sulphuric acid, to bring the impurities contained in the metallic oxides into a soluble state. The ores and salt are placed in a granite, slate, or earthenware or wooden vessel, and sulphuric acid somewhat in excess is poured thereon, so as to dissolve the salt. A jet of steam is used to keep the mixture at about 200° F., and 6 or 7 lbs. of nitrate of soda or potash may be added thereto, or a solution of the salt may be added to the ore and sulphuric acid. In about 24 hours the liquor may be drawn off from the vessel, and the metallic chlorides, sulphates, and nitrates may be washed out by solution in water, leaving the tin ores purified, and fit for the smelting process.

[Printed, 3½d.]

A.D. 1853, March 16.—N° 654.

COLT, Samuel. — "Improved apparatus for heating and "annealing metals." The specification and drawings describe an annealing furnace in which the metal is placed in a cast iron box, which is set in brick work, and forms the top of the fire

place; the flames are conducted round it by flues. A tube is fixed in the box, extending from end to end, and opposite, and a sight hole is made in the front of the furnace, through which the tube can be seen. When its colour shows that the process is completed, the fire is damped, and the furnace is allowed to cool down gradually.

A forge for heating metals is described, with which anthracite may be used. The coal is gradually heated before it is pushed on to the fire.

[Printed, 8½*d.*]

A.D. 1853, March 22.—N° 700.

JOHNSON, JOHN HENRY.—" Improvements in the mode of " smelting iron and other ores."—(*A communication.*)—*Provisional Protection only.* Metallic ores mixed with charcoal are to be smelted by the application of the electric light. The ores are placed between the holes of two large electrodes.

[Printed, 2½*d.*]

A.D. 1853, March 24.—N° 718.

KEATES, WILLIAM.—" Improvements in the manufacture of " tubes and mandrils." Tubes of soft metals and alloys, as copper, brass, &c., are made by casting a hollow cylindrical ingot of the metal or alloy in a cast iron or other metal mould having a cast-iron or other metal core, slightly tapered, to form a circular aperture in the ingot.

The ingots are rolled on a mandril through rolls having grooves of a peculiar shape, as described in the drawings. The alloy which is preferred for tubes consists of 62 parts of copper and 38 parts of zinc.

[Printed, 5½*d.*]

A.D. 1853, March 28.—N° 741.

DERING, GEORGE EDWARD.—" Improvements in the manu- " facture of certain salts and oxides of metals." The refuse metallic salts used in galvanic or electro processes are obtained from the " partially saturated metallic liquids resulting from the work-

" ing of galvanic batteries" by the addition of corresponding metals, and evaporation and crystallization. Oxides of the metals are thus obtained.

[Printed, 4½*d.*]

A.D. 1853, April 6.—N° 828.

JOHNSON, WILLIAM.—" Improvements in the production of " ornamental surfaces in glass, porcelain, metals, and similar " materials."—(*A communication.*) Metals, or alloys, or glass, or porcelain, of different colours, may be combined in different figures, by punching out pieces of metal or other substances, and replacing them by other pieces of different colours, like mosaic work.

[Printed, 5½*d.*]

A.D. 1853, April 11.—N° 862.

RUGGLES, ROBERT BOSTWICK, and SERRELL, LEMUEL WRIGHT.—" Improvements in machinery for beating gold and " other laminæ of metal."—Self-acting hammering apparatus is described, with drawings, for beating out gold into leaves. The " hammer and parts connected give a motion corresponding to that given by the human arm in beating gold.

[Printed, 11½*d.*]

A.D. 1853, April 14.—N° 912.

ZENNER, DAVID.—" Improvements in the treatment of ores " and other substances containing metals, to obtain products " therefrom, and the apparatus used therein." Modes of treating " pyritical" ores are described with the aid of drawings. The ores, which usually contain small quantities of precious or valuable metals, are heated in a vertical retort, heated by flues circulating around it. They are introduced at the top, gradually descend, and as they are heated, are withdrawn at the bottom.

The heated ores are dissolved in a close vessel in diluted sulphuric acid; such a quantity of acid is used as will dissolve nearly, but not quite all the sulphuret of iron, leaving the other substances undissolved. The solutions are removed, and treated apart, the concentrated residues are subjected to the requisite operations to obtain the valuable metals they contain.

The ores may be roasted and then dissolved in an acid, and the

solution is treated with currents of sulphuretted hydrogen gas, and sulphuret of iron added thereto in sufficient quantities to precipitate the valuable metals.

Or sulphides of an alkali or alkaline earths may be used to cause precipitation.

Protosulphuret of iron or any substance containing it may be used instead of metallic iron "to reduce the tersulphate of per-" oxide of iron," or to saturate the "free acid" contained in " the solutions or liquors obtained from the pyrites' beds," or obtained by dissolving slags or other substances containing iron in sulphuric acid, for the purposes of making copperas.

[Printed, 6½*d.*]

A.D. 1853, April 19.—N° 942.

CHATTERTON, JOHN.—" Improvements in coating tubes."—Tubes of gutta percha, or india rubber, or other similar substance, are coated with lead, or other soft metal. The tube of soft metal is drawn over the other tube, and the two are passed through rollers or a draw plate.

[Printed, 2½*d.*]

A.D. 1853, April 23.—N° 984.

NAPIER, JAMES.—" Improvements in separating certain metals " from their ores and alloys, and for obtaining certain products " therefrom." These relate to ores of copper and tin, and their alloys. In treating copper ores, the sulphurets of copper which contain tin are separated from those which do not, and are sorted, so that the average of copper contained therein may be from 8 to 14 per cent of the whole. The ores are then calcined until the weight does not exceed one fifth of that of the copper present. This is ascertained by grinding a small sample and boiling 25 grains in aqua regia for 15 minutes, diluting with water, filtering, and adding chloride of barium to precipitate the sulphur. The precipitate should contain about 3 grains in 22 grains of weight. Ordinary sulphurets may be calcined for about 16 or 18 hours. The calcined ore is fused with about 1 cwt. of coal to a ton of ore. The metallic portion, or "mat," is run into beds. At the bottom of the first and second beds is found a coarse alloy of copper, tin, and iron; this is removed, and the remainder of

the mat or regulus is reduced in the ordinary way; or, after being calcined for about 18 hours, it may be fused with equal quantities of Australian ores, which contain no sulphur.

Sulphuret ores, which contain no tin, are sorted, so that there be present not less than 9 per cent. of copper. The ores may be calcined for 12 hours, and then reduced. If there be present more than 12 per cent. of copper about 1 cwt. of coal may be added to each charge to prevent loss of copper in slag. Copper ores, which contain tin and no sulphur, are mixed with sulphuret ores.

The "white metal" produced as above described, is ground to a powder, and oxydised, by preference, by subjecting it to calcination at a low red heat, or by heating it with nitrates or other compounds which yield oxygen readily by heat. The oxydised powder is heated with dry caustic alkali, 1 lb. to each pound of tin in the alloy, at 600° F. to about 900° F. for about an hour. When the mass is cooled it is withdrawn, water is added thereto, which "dissolves the stannate. The insoluble oxides of copper and iron "are separated by subsidence or filtration." To the solution of stannate of soda slacked lime is added (27 lbs. to 100 lbs.) and boiled. "An insoluble stannate of lime" is precipitated. This is collected, dried, and fused with one third of sand or pure silica, and one sixth of anthracite coal. Tin ores are treated by a process similar to that above described for the sulphuret copper ore.

[Printed, 3½*d.*]

A.D. 1853, April 26.—N° 997.

JOFFRIAUD, Jacques Emile, and RIVIÈRE, Rodolphe.—"Improvements in machinery or apparatus for washing earths "containing gold extracted from the bottoms of rivers or other "waters."—A dredging or raising machine for raising auriferous earths is combined with washing apparatus, as described, with drawings. A series of buckets attached to an endless chain is worked by suitable pulleys. The ores are washed in a trough or cradle, in which suitable agitating arms are made to work.

[Printed, 7½*d.*]

A.D. 1853, April 27.—N° 1010.

HETHERINGTON, John, DUGDALE, John, the younger, and DUGDALE, Edward.—Improvements &c. in "casting iron,

" brass, and other metals for various purposes." The specification and drawings describe modes of constructing and forming patterns or models used in "plate moulding;" also in moulding metal pipes, circular work, and circular segments, and other similar forms.

[Printed, 7½d.]

A.D. 1853, May 2.—N° 1060.

REEVES, JAMES.—" Improved machinery for forging, stamping, " crushing, or otherwise treating metals, ores, and other similar " materials." A vertical hammer or crusher is made to work in suitable guides; a rack is attached to it, and is raised by means of a toothed sector or toothed sectors, connected with a revolving arm or arms. When the sector is released from the rack the crusher is allowed to fall by its own gravity.

[Printed, 1*s*. 3½*d*.]

A.D. 1853, May 3.—N° 1078.

CORNIDES, LOUIS.—" Improvements in treating certain ores " and minerals for the purpose of obtaining products therefrom." Ores of gold and silver are crushed and are amalgamated with quicksilver in a closed vessel made of a material that has no affinity for quicksilver. The air is exhausted from the vessel, and the amalgamating process is carried on in vacuo. Exhaust apparatus is also used for separating the quicksilver and straining it through leather.

[Printed, 1*s*. 7½*d*.]

A.D. 1853, May 5.—N° 1105.

STIFFEL, JEAN CONRAD.—" Improvements in machinery for " crushing auriferous quartz and amalgamating the gold there- " from."—(*A communication from H. Berdan, of New York, U. S.,*) —*Provisional Protection only.* The ore is first broken small then pulverised in an iron basin, which is attached to a shaft working at an angle of about 25° from the perpendicular. The basin has thus imparted to it a rotating motion while it is held in a " tilted " position." A ball weighing about 2,000lb. works in the basin; quicksilver is used for the amalgamating process, and heat may be applied by means of a furnace.

[Printed, 2½*d*.]

A.D. 1853, May 6.—N° 1119.

JACOB, GEORGE WILLIAM.—"An improved manufacture of "metallic covers or seals for bottles," &c. Metal covers or capsules are made by casting a suitable fusible alloy as type metal, lead and antimony, or tinman's solder or pewter in moulds or matrices. The sides of the mould are coated with "crocus or per-"oxide of iron," or other suitable powder.

[Printed, 6½*d.*]

A.D. 1853, May 6.—N° 1122.

LONGMAID, WILLIAM, and LONGMAID, JOHN.—"Improve-"ments in treating waste products obtained in smelting and "otherwise treating ores and minerals and in producing a valuable "product or products therefrom." The slags obtained from smelting iron, copper, and other ores, are cast in the form of slabs or blocks or other suitable shapes, and are annealed to toughen them. Alkali waste, consisting chiefly of oxide of iron, silica, compounds of lime and metallic substances may be mixed to form a fusible slag.

[Printed, 3½*d.*]

A.D. 1853, May 11.—N° 1161.

MOTTRAM, JOHN.—"Improvements in machinery for washing "ores and separating metals from earth or other compounds."—*Provisional Protection only.* A combination of levers is to be used for agitating, and raising, and depressing a washing vessel or sieve. The sieve is made to work in water contained in a larger vessel and is provided with suitable apparatus for washing ores.

[Printed, 4½*d.*]

A.D. 1853, May 27.—N° 1307.

STEVENS, JOHN LEE.—"Improvements in furnaces."—*Provisional Protection only.* The fuel in the fire-places of furnaces is to be supported upon water spaces or dead plates instead of the ordinary fire bars.

[Printed, 2½*d.*]

A.D. 1853, June 8.—N° 1402.

DANCHELL, FREDERICK LUDEWIG HAHN, and STARTIN, WILLIAM.—" An improved mode of obtaining auriferous deposits from the beds of rivers and lakes and from pits containing water." The end of a tube is inserted into the auriferous deposits in the bed of a river. The water is agitated and the deposits stirred in the tube. Suction or other apparatus is employed for creating and upward flow, and drawing the water and deposits held in solution therein. The deposits may be afterwards washed, and gold be separated therefrom by any convenient process.

Printed, 6½*d.*]

A.D. 1853, June 17.—N° 1476.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—" Improve-" ments in machinery for pulverizing and washing quartz or ore " and for amalgamating the gold contained therein."—(*A communication.*) A crushing ball is made to work in a circular basin, " whose axis moves in such a way as to describe a cone around an " imaginary fixed axis, but does not cause the basin to rotate."

The crushing basin is surrounded wth another basin, in which the amalgamating process is carried on. Water is admitted to the crushing basin and carries off waste, and conveys the metallic particles through suitable screens to the amalgamating basin.

[Printed, 6½*d.*]

A.D. 1853, July 2.—N° 1590.

WRIGHT, LEMUEL WELLMAN.—" Improvements in machinery " or apparatuses for reducing and pulverizing gold and other " metalliferous quartz and earths and in separating metal there-" from." The ores are roughly crushed by passing them between a centre roller and several smaller ones grouped around it; they are then further pulverized by passing them through two heavy rollers; they are afterwards washed in a machine, consisting of a trough in which a wheel with dashers revolves; the crushed ores are mixed with the water and pass with it into a deep " agitator " vessel," in which is a central shaft carrying arms, which are

made to rotate; these throw the lighter earthy particles to the circumference, while the heavier metallic ones fall in the centre and are removed.

[Printed, 6½*d.*]

A.D. 1853, July 5.—N° 1605.

POOLE, MOSES.—"An improved quartz crushing, pulverizing "and amalgamating machine."—(*A communication.*)—*Provisional Protection only.* A chilled cast-iron oblong trough is used, in which a chilled cast-iron ball is to roll backwards and forwards, moved by a connecting rod attached to a crank.

An iron pulverizing mortar is also used, in which a pestle is made to work by means of a suitable crank motion.

[Printed, 2½*d.*]

A.D. 1853, July 8.—N° 1625.

CORNIDES, LOUIS.—"Improvements in treating certain ores "and minerals for the purpose of obtaining products therefrom." The crushed ores are amalgamated with quicksilver, and are introduced with water into a cylindrical agitating vessel. The vessel is lined with copper, and on its bottom are strewed balls of copper, the copper being coated, by preference, with a solution of one part of quicksilver, and 2 parts of nitric acid.

A rotating agitating fan is used to stir up the amalgam, and the gold and quicksilver are separated from the earthy particles, and are deposited upon the copper.

[Printed, 7½*d.*]

A.D. 1853, July 11.—N° 1650.

DALTON, GEORGE.—"Improvements in reverberatory and "other furnaces." The air is made to enter into the furnace through openings made at its front or sides. It is made to traverse by means of flues, the sides, bottom and other heated parts of the furnace, and so take up "as much as possible of the "waste heat." It then enters into a closed ash pit, below the fire bars, through suitable openings made in the side of the pit.

[Printed, 5½*d.*]

A.D. 1853, July 14.—N° 1672.

HENDERSON, WILLIAM.—" Improvements in the construction " of furnaces for the purpose of obtaining products from ores." Compound furnaces are described with drawings, in which two or more beds are used. By preference two working or calcining beds or soles, and a drying bed at the top are employed.

Four fires are used, two at each end.

For operating upon zinc, arsenic, lead, and antimony ores, condensing apparatus is attached to the furnace.

[Printed, 6½d.]

A.D. 1853, July 19.—N° 1714.

BREESE, CHARLES. —"A method of forming designs and " patterns upon papier mache, japanned iron, glass, metal, and " other surfaces." Patterns drawn upon stone or other suitable surfaces are imprinted upon paper or other surfaces in suitable adhesive mixtures, and are transferred to the metallic or other surface, which has been previously " covered with gold or silver, " by what is known as the amalgamation process."

Acids or other agents are then used to remove the unprotected parts of the gold or silver, leaving a figure, which is made apparent by removing the adhesive impression.

[Printed, 3½d.]

A.D. 1853, July 20.—N° 1717.

SMITH, EDWIN DALTON.—" Improvements in crushing and " washing ores and earths." Two crushing machines are described, one for heavy, the other for lighter work.

The former consists of a vessel having a vertical axis carrying four or more arms, on which work heavy toothed rollers, which crush the materials on a bed plate; water is admitted into the vessel.

For lighter work a hollow cylinder is used, which turns on a horizontal axis, from which hang toothed rollers. The materials are crushed between the toothed rollers and the periphery of the drum.

[Printed, 5½d.]

A.D. 1853, July 25.—N° 1745.

IRELAND, William.—" Improvements in the mode or method " of melting or fusing iron or other metals, and in the apparatus " employed therein." A melting furnace is described with drawings. It is high, and has "a taper form in the inside above " the contraction," which is intended "to prevent the metal " from sticking or crusting to the sides."

Hot air is introduced by means of a fan.

[Printed, 7½*d.*]

A.D. 1853, July 29.—N° 1777.

NEWTON, William Edward.—" Improvements in depositing " metals or alloys of metals."—(*A communication.*) The electro or galvanic process is employed to coat metals with copper or with an alloy of zinc and copper resembling brass, or of copper and tin resembling bronze, or of copper, zinc, and tin.

The solutions used are "principally double salts of the metals, " and some alkaline base." Ten solutions are enumerated as used in depositing brass.

Many othèr solutions are also specified.

[Printed, 3½*d.*]

A.D. 1853, August 3.—N° 1815.

RODEN, William Sargeant, and THOMAS, William.— " Improvements in rolling metals." To save labour, two or more pairs of rolls are employed, they are "unconnected with " each other, and revolve in contrary directions." They may be driven by the same, or different power. The work is passed through one pair, and repassed through a different pair.

[Printed, 6½*d.*]

A.D. 1853, August 4.—N° 1824.

RODEN, Richard Brown.—" Improvements in rolling iron " and all other malleable metals and alloys." " Three high rolls " *are used,*" *the middle* roller remains stationary as to the

position of its axis, the other two rollers are adjusted relating to the middle roll, to which the driving power is applied.

Lifting apparatus, worked by the piston rod of an engine, may be attached to the rollers.

[Printed, 5½d.]

A.D. 1853, August 5.—N° 1836.

NEWTON, William.—"Improvements in the process of coat- "ing cast iron with other metals, and the alloys of other metals." —(*A commnication.*) A coating of copper or zinc is first deposited on the iron. For copper a saturated solution of sulphate of copper is used; it is precipitated with carbonate of potash, and re-dissolved in cyanide of potassiam. The iron may be first coated with zinc, then with copper.

A coating of brass is then deposited thereon by mixing the solution of copper first used with the solution of zinc.

Coating of silver or gold may be subsequently deposited.

[Printed, 3½d.]

A.D. 1853, August 6.—N° 1843.

MORRISON, Robert. — "Improvements in apparatus for "forging, &c., and crushing ores." Apparatus which may be used for crushing ores is described with drawings. A truly turned cylindrical bar of wrought iron forms the hammer or crusher, on the bar the piston and grinding surfaces are forged or cast solid. The steam cylinder is bolted to a pair of plate standards, and the piston works through upper and lower stuffing boxes in it, and is guided by a T-head at its upper projecting end.

[Printed, 8½d.]

A.D. 1853, August 20.—N° 1945.

COCHRAN, John Webster.—"Improvements in machinery "for crushing, grinding, and pulverizing stone, quartz, or other "substances." A circular plate "more or less flanged or curved "upwards throughout its whole circumference, is fixed on a "foundation." Balls, hollow spheres, or shells, generally six in number, and each alternate one being smaller than the others,

work in the plate. A top plate, somewhat similar to the bottom one is made to rotate, and press upon the balls, and crush and pulverize quartz or other ores placed in the lower plate.

In the place of the balls conical or other wheels driven by the upper plate may be used.

[Printed, 5½*d.*]

A.D. 1853, August 23.—N° 1958.

POOLE, MOSES.—"Improvements in crushing and pulverizing quartz and other substances."—(*A communication from T. Briggs Smith, of Taunton, Mass., U. S.*) A circular conical trough is described with drawings, it has a corrugated bottom, and "corru-" gated or toothed rollers working upon the corrugated surface." The rollers are connected by radial arms with an upright vertical shaft, round which they turn.

The quartz or other ores are thus crushed between two corrugated surfaces.

[Priuted, 6½*d.*]

A.D. 1853, August 27.—N° 1995.

ROBINSON, GEORGE.—"The novel application of the slags or " refuse matters obtained during the manufacture of metals." The slags are run upon an iron or other table, which is heated. It is formed by pressing or rolling into slabs or plates, which are annealed, and may be applied for roofing, paving, or other purposes."

[Printed, 8½*d.*]

A.D. 1853, September 6.—N° 2051.

WILKINSON, HENRY.—"Improvements in the construction of air furnaces," &c. Furnaces specially suited for brass founders' work are described with drawings. To withstand the great heat, employed the furnace is lined with fire clay and glass-grinders' sand, or with the latter alone, or with other non-conducting material.

Moveable bars worked by an arm or lever are used, by which the fuel can be at once discharged from the furnace.

[*Printed, 8½d.*]

A.D. 1853, September 10.—N° 2090.

BRUNTON, John Dickinson.—"An improved apparatus for "separating gold or silver from their ores or other matters by "amalgamation."—*Provisional Protection only.* The provisional specification describes, with the aid of a drawing, amalgamating apparatus, a vessel with a conical bottom, and a steam jacket is used for containing the mercury, and two sieves are suspended within it. A bent pipe of a hight of at least as many feet as the mercury in the vessel is inches in depth, communicates with the bottom of the vessel. The water and ground ore is made to descend by the bent pipe, and the pressure thereof overcoming the weight of mercury, the ores enter at the bottom of the vessel, and are forced up through the mercury being separated in a finely divided state by the suspended sieves. The particles of precious metals are freely acted upon, and are thus to be readily taken up by the mercury.

[Printed, 4½*d.*]

A.D. 1853, September 12.—N° 2113.

NEWTON, Alfred Vincent.—"Improved machinery for "crushing and grinding mineral and other substances."—(*A communication.*) The minerals are crushed by the centrifugal action of balls revolving round an axis, and acting against the inner periphery of a rotating shell or vessel, into which the minerals are fed, supplied from suitable tubes.

[Printed, 5½*d.*]

A.D. 1853, September, 13.—N° 2120.

BEHRENS, Jacob.—"Improvements in the manufacture of "zinc." The process of making zinc is connected with the production of coke from the coal used in obtaining the requisite heat.

A series of retorts are connected with a coke oven, and the heat generated therein is made to act upon the retorts, to which suitable condensing apparatus is attached.

[*Printed, 1s. 5½d.*]

A.D. 1853, September 20.—N° 2185.

GIBBS, Joseph.—" Improvements in the treatment of minerals " for the purpose of separating impurities therefrom." Grinding and washing machines suitable for crushing and washing coal and other minerals, and separating them from impurities are described with drawings. Large grinding stones are used, working horizontally. Sifting machines are described.

[Printed, 7½*d.*]

A.D. 1853, September 27.—N° 2215.

CALLAN, Nicholas.—" A new mode of protecting iron of " every kind," &c.—*Provisional Protection only.* Iron surfaces are to be coated " with an alloy of lead and tin by first tinning " them in the usual way," and then immersing them in a bath of molten lead covered with fat.

The alloy should consist of 1 part tin and about 5 or six parts of lead.

[Printed, 2½*d.*]

A.D. 1853, September 29.—N° 2234.

BERDAN, Hiram.—" A machine for collecting, preserving, and " thereby preventing loss of mercury in the process of amalga- " mating metals, and for the more perfect and economical washing, " separating, and amalgating of auriferous and other ores."—*Provisional Protection only.* An amalgamating machine is described, in which the crushed ores are forced by centrifugal action up through a bath of mercury. The ores are fed into a tubular central shaft, which is made to rotate in the centre of a vessel containing mercury, and are driven through openings made at the ends of radial tubular arms turned with the central shaft.

[Printed, 2½*d.*]

A.D. 1853, October 12.—N° 2340.

CALLAN, Nicholas.—" A means of protecting iron," &c. The iron is coated, an alloy being first tinned, then coated with lead, as *described above, N° 2215.*

An alloy of lead, tin, antimony, and zinc may be used.

The alloy should contain at least as much lead as tin, and not more than 7 or 8 times as much; 1 part of zinc or antimony may be used with 8 to 12 parts of lead.

[Printed, 2½*d.*]

A.D. 1853, October 13.—N° 2357.

LILLIE, Sir JOHN SCOTT.—"Improvements in machinery for "breaking stones and other hard substances." The crushing or breaking machinery consists of hammers, wheels, or other crushing apparatus and anvils, provided with suitable stops or studs. The stops are so arranged and adjusted as to prevent the surfaces from coming into close contact, and the substances are thereby broken into pieces of the required size.

[Printed, 2½*d.*]

A.D. 1853, October 15.—N° 2380.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—"Improve-"ments in the treatment of copper ores."—(*A communication.*) The copper ores may be calcined in the open air in stacks or in kilns, and are reduced to sulphates. These are washed in suitable vats, and the solution is evaporated by heating it in shallow vessels, vegetable charcoal being added thereto. The deposited copper is formed into bricks and heated, and dried in ovens, and then melted in a "Castilian furnace or in German cupels."

[Printed, 5½*d.*]

A.D. 1853, October 17.—N° 2392.

PASS, CAPPER.—"Improvements in the manufacture and "refining of copper."—Copper ores and slags are smelted in a small blast furnace with the usual suitable fluxes. If the ores contain 20 per cent. or more of iron, the metal and slag are tapped and allowed to flow over two or more beds of sand through tapholes opened in succession. If the ores contain but little iron the slag is allowed to flow from the furnace, and the metals are left; and, when the crucible is nearly full, are tapped in the usual way. The metallic mass thus produced is melted with calcined

sulphurous ore in an ordinary reverberatory furnace; the iron combines with the slag and passes off with it. On tapping the furnace and running the metal into beds of sand, the copper and alloys it may contain will be found in the beds nearest to the furnace; the sulphuret of copper will be in the distant ones, and may be at once refined, or, if necessary, be remelted.

[Printed, 2½*d.*]

A.D. 1853, October 18.—N° 2401.

NOEL, ALPHONSE DOSTE.—" Improvements in the manufacture " of zinc white." A furnace is described having two heating chambers, in which are set retorts. The heat passes from the fire place into the first chamber, and thence passes into the second, and thence into the chimney. Suitable pipes convey the fumes into a side compartment where they are treated with sulphurous acid vapours.

[Printed, 8½*d.*]

A.D. 1853, October 26.—N° 2472.

PALMER, GEORGE HOLWORTHY.—" Improvements in the construction of air furnaces for the fusion of steel and other metals and for economising fuel."—*Provisional Protection only.* The provisional specification describes, with the aid of drawings, which should be referred to, compound air furnaces in which carbonic oxide is used in fusing metals. From 3 to 20 furnaces may be made to work together.

[Printed, 8½*d.*]

A.D. 1853, October 26.—N° 2474.

PENROSE, WILLIAM.—" Improvements in the reduction of " silver ores by mixture with other materials."—*Provisional Protection only.* It is proposed to convert all silver ores into sulphurets of silver and lead by fusing at a moderate heat the ores with " suitable fluxes, such as spar, black band, rock salt, and slags, " &c." When the charge is melted, two or three pigs of lead are thrown into it; and when the metal is run out the metal and slag are run into separate channels. The metal is refined in the ordinary way.

[Printed, 2½*d.*]

A.D. 1853, November 1.—N° 2526.

WHITEHEAD, John, and WHITEHEAD, Thomas.—" Im-" provements in cutting tools, and in the working of iron, brass, " and other metals, and wood and other materials." The specification and drawings describe machinery for turning cylindrical surfaces in which three cutting tools are employed; also machinery for cutting the teeth of wheels, and for planing, slotting, and grooving metals.

[Printed, 5½*d.*]

A.D. 1853, November 4.—N° 2564.

NEWTON, William Edward.—" Improved machinery for " crushing ores and separating therefrom gold, silver, or other metals contained therein."—(*A communication.*) Ores are crushed by rollers working in concave chambers or beds with an oscillating or rocking motion instead of a simple rotating motion. The motion is given by levers, to the ends of which the rollers are connected. The pulverised substances are forced through a bath or series of baths of mercury, which may be heated by steam. The apparatus is described with drawings.

[Printed, 7½*d.*]

A.D. 1853, November 7.—N° 2579.

PERSHOUSE, Henry, and MORRIS, Timothy.—" Improve-" ments in the deposition of metals and metallic alloys." Vessels divided by a thin porous partition are employed; a separation is thereby effected between the surface on which the deposit is to be made and the plate of metal or alloy which is to be deposited, instead of allowing both to be in the same vessel with the solution.

[Printed, 3½*d.*]

A.D. 1853, November 11.—N° 2623.

DÉLANDE, François Amand.—" A new metallic composi-" tion." An alloy resembling silver is thus formed. Take tin of the purest quality, calcine it two or three times with *saltpetre, pulverise* it well, and melt it in a crucible; mix with

charcoal, and draw off the purified portion. Three processes of working the purified tin are described :—

1. Mix two gallons of quick lime with 12 gallons of pure water; evaporate by boiling so as to reduce by a half; add 10 oz. of sea salt and 10 oz. of rock salt, pulverized. Then fuse 2 lbs. of the purified tin with about a pound of best soft iron; pour the fused metal into the lime and salt water in small quantities, changing the water at every pouring. Then mix together an oz. of borax, an oz. of sal ammoniac, and ½ oz. of arsenic (red, if a dark, yellow, if a light, colour is desired for the alloy), and form a paste with the white of egg. Place a portion of the granulated refined tin at the bottom of a crucible, then a layer of the paste, then another layer of tin, and fuse; pour off in about an hour and a quarter. Pounded alum may be added to give brilliancy to the alloy, which may be rolled or moulded. Other modes of treating the tin by pouring it into solutions of vine ashes and milk and vinegar are described.

[Printed, 3½*d.*]

A.D. 1853, November 12.—N° 2626.

GEDGE, John.—"Improvements in the manufacture of metallic " compounds."—*Provisional Protection only.* An alloy is proposed to be made by melting together (the proportions are not stated) copper and nickel, and adding thereto borax and saltpetre. Tin and zinc are added, and animal charcoal are melted together and employed as a covering.

[Printed, 2½*d.*]

A.D. 1853, November 15.—N° 2645.

CAMERON, John, and NAPIER, James.—" Improvements in " obtaining gold and silver from ores, alloys, or compounds con- " taining such metals." The ores and compounds are classified according to their nature. Those which contain copper or other metal which is to be recovered, are separated from those ores which contain gold and silver.

The latter are fused in a reverberatory furnace; fluxes are added to make a fluid slag, as carbonate of soda or potash; other alkaline carbonates or sulphates may be used. The slag is stirred,

skimmed, and tapped. The gold and silver "will be obtained at "the bottom under the slag, ready for parting;" or, if alloyed with other metals, or with sulphur and oxygen, the regulus formed is ground and calcined; the metals being converted into oxides are fused in a pot, with ½ per cent. of carbonate of soda or potash.

If the ores contain copper and sulphur, the ordinary smelting process is used as for copper; the regulus is pulverized and calcined with common salt, and is converted into a chloride.

Gold and silver are separated from alloys by fusing them with such substances as will produce a brittle compound; this is pulverized and calcined with alkaline or saline compounds.

[Printed, 3½d.]

A.D. 1853, November 24.—N° 2736.

RICHARDS, EVAN MATTHEW.—"Improvements in feed plates "to be used for oxidizing lead, and refining silver and lead." —*Provisional Protection only.* The plate used is to be cast hollow, and water is passed continuously through it, whereby the quality of the litharge is said to be improved, and the wear of the plate is saved.

[Printed, 2½d.]

A.D. 1853, November 30.—N° 2784.

DAVIS, EDWARD KEATING.—"Improvements in machinery for "making pipes, sheets, still worms, and other articles, from that "class of metals called soft metals, as lead, tin, zinc, bismuth, "or alloys of soft metals," &c. The specification and drawings describe double acting presses, and apparatus for melting and casting metals, and coating them so as to manufacture pipes and tubes of soft metals, and their alloys.

[Printed, 1s. 0½d.]

A.D. 1853, December 3.—N° 2817.

GWYNNE, JOHN, and GWYNNE, JAMES EGLESON ANDERSON. —"Improvements in the manufacture of fuel, its preparation and "applications for the reduction of ores, fusing and refining "metals, cementation of making steel, and treating salts." Peat is dried and pressed, and cut into suitable blocks by passing it through rollers having projections on their surfaces. The peat

may be then applied as fuel in smelting, or fusing, or refining various metals; or the peat may be ground fine, and mixed with suitable fluxes, and used for making up the charge for a furnace.

[Printed, 4½*d.*]

A.D. 1853, December 9.—N° 2864.

WINSPEAR, John.—" An improved mode of coating metals," &c.—*Provisional Protection only.* Metallic surfaces are covered with a varnish composed of vegetable or mineral gum, to which is applied a protecting coating of powdered Roman cement, combined or not with pulverized calcined shells. A hot blast is used for applying the coating; powdered glass, flints, and borax may be used.

[Printed, 2½*d.*]

A.D. 1853, December 13.—N° 2891.

PLUMMER, William Frederick.—" Improved machinery for " grinding or crushing animal, vegetable, and mineral substances." Three crushing rollers are used. The upper rollers are placed side by side, the axis of one being slightly higher than that of the other. The materials are fed from a hopper between the two upper rollers, and pass between the lower roller and the one next above it, and are delivered ground out of the machine by a shute.

[Printed, 5½*d.*]

A.D. 1853, December 16.—N° 2931.

PARKES, Alexander.—" Improvements in separating silver " from its ores or other compounds."—*Provisional Protection only.* Galena is to be used in small quantities for reducing silver ores. From 2 to 5 cwt. of galena are used with a ton of silver ore, and 2 cwt. stone coal. Fluor spar, oxide of iron, or other flux, may be used, if the ores are difficult of fusion.

Silver ores may be fused with metallic iron, oxide of manganese, granulated copper slag, lime, and other suitable fluxes.

A ton of silver ore may be fused with 4 to 6 cwt. of galena (uncalcined), 2 to 5 cwt. of oxide of iron, 2 to 4 cwt. of stone coal, and fluxes.

Zinc ores may be fused with silver ores.

[Printed, 2½*d.*]

A.D. 1853, December 16.—N° 2932.

HALL, Robert Burt.—" Improvements in crushing and grind- " ing quartz, minerals, and other matters."—*Provisional Protection only.* A semicircular trough is to be used, in which gold ores and earths are crushed, washed, and amalgamated by the action of two or more spheres."

[Printed, 2½d.]

A.D. 1853, December 20.—N° 2965.

HUYGENS, R. B.—" Improvements in machinery for crushing, " washing, and amalgamating gold and other ores and sub- " stances." A basin or trough is described (with drawings), which has its interior formed of "parabolic or other curves, presenting " angles of ascent and descent, for facilitating percussion and the " action of crushing spheres or discs." The spheres are not liable to become clogged as they are when basins of a semicircular or other regular shapes are used."

[Printed, 10½d.]

A.D. 1853, December 29.—N° 3015.

ESTIVANT, Edward.—" Improvements in the manufacture of " tubes of copper and its alloys."—*Provisional Protection only.* The tubes are cast in short lengths, and it is proposed to extend them by hammering them upon mandrils, and annealing them, and repeating the process as required."

[Printed, 2½d.]

A.D. 1853, December 30.—N° 3026.

RUOLZ, Henri Catherine Camille de, and FONTENAY, Anselme de.—" An improved metallic alloy." An alloy resembling silver is obtained by melting together,

Silver, 20 parts;
Nickel, 75 to 30 parts;
Copper, 75 to 70 ,,.

The copper must be the purest copper of commerce. The nickle *is purified* by dissolving it in hydrochloric and nitric acid, or

diluted sulphuric acid. The solution is treated with currents of chlorine; iron impurities are precipitated by boiling with carbonate of lime. The nickel is "precipitated by carbonate of "soda, and taken up again by hydrochloric acid and diluted" with water. The solution is saturated with chlorine gas, and carbonate of baryta is added in excess. The liquor is cooled, and nickel is precipitated in a metallic form by galvanic action, or as an oxide, which is to be reduced to the metallic state in the ordinary way.

In treating speiss, "100 parts are mixed with nitre 20 parts, "feldspar 100 parts; by this means cobalt is produced in a state "of blue glass." This is roasted, washed, and dissolved in sulphuric acid, and treated as above described for nickel.

The proportions given may be increased to silver 30, nickel 31, copper 49 parts, total 110. The copper and nickel should be melted in a granular state, and then silver is introduced; powdered charcoal and borax are used as a flux.

The ingots of the alloy may be annealed in charcoal to make them malleable.

[Printed, 2½*d.*]

A.D. 1853, December 31.—N° 3033.

PYM, John.—"Improvements in machinery for grinding auri"ferous and other ores, and separating the metal therefrom." A basin or mortar is used, having a number of circular grooved channels formed therein at different levels, the outer ones being lower than the inner ones. The ores are crushed, washed, and amalgamated by means of revolving discs or runners, working in the grooved channels, and connected by radial arms to a central shaft. The ores are fed into the centre of the machine, and pass with water from the higher to the lower grooved channels.

[Printed, 5½*d.*]

A.D. 1853, December 31.—N° 3035.

TRUEMAN, Alfred, and BAGGS, Isham.—"Improvements "in grinding, amalgamating, and washing quartz and other mat"ters containing gold." A heavy spherical crusher is made to work in a circular vessel of section, corresponding to that of the crusher. *The vessel revolves* vertically on hollow horizontal axes,

through one of which water and ores are introduced, while the waste passes off through the other. The ores are crushed, washed, and amalgamated by the rotation of the vessel, and the action of the spherical crusher.

[Printed, 6½d.]

1854.

A.D. 1854, January 5.—N° 28.

NEWTON, ALFRED VINCENT.—" Improved machinery for " crushing or grinding and washing and amalgamating quartz, " rock, and other substances."—(*A communication.*) Quartz, or other ores are ground in an annular trough, formed of iron. One or more crushing wheels or rollers are made to run in the trough. They are connected by arms to a vertical centre shaft, and have a sufficient amount of rise and fall to enable them to pass over lumps of rock.

On the inner face of the crushing wheel is fixed a bevelled cog wheel which is made to work in a toothed ring attached to the inner side of the annular trough, in such a way that the periphery of the crushing wheel, as it rolls round, is also made to slide, and it therefore grinds as well as crushes the rock or ores. Water is introduced into the annular trough, and conveys the powdered ores into an outer trough, where they are amalgamated with quicksilver in the ordinary way.

[Printed, 7*d.*]

A.D. 1854, January 10.—N° 61.

TIZARD, WILLIAM LITTELL.—" Machinery for stamping, " crushing, washing, and amalgamating gold and other ores." Two or more corrugated hollow wheels, or cylinders, or rings, are connected with an axle or central shaft. Inside the cylinders or rings, solid or hollow balls, which may be filled, when required, with lead, or discs are fixed working on uneven bearings, so that as the cylinders or wheels are turned round, the balls have an *irregular sliding* motion imparted to them. The axle has cams or

lugs, and works crushing stampers for partly crushing the ores, which are afterwards ground to powder, and amalgamated with mercury in the corrugated wheels or rings, which may be heated by steam jackets.

[Printed, 7*d.*]

A.D. 1854, January 11.—N° 68.

BROOMAN, Richard Archibald.—"Improvements in ex-"tracting gold from the ore."—(*A communication.*)—*Provisional Protection only.* The provisional specification describes, with the aid of a drawing, an amalgamating machine. The crushed ores are introduced into a hollow central shaft, working in a suitable cylindrical amalgamating vessel. Hollow horizontal arms are connected with the central shaft, and through openings made in their ends, the crushed ores are evenly distributed, and thoroughly mixed with the mercury in the vessel. To facilitate the amalgamation process, the mercury is to be kept charged with electricity. To effect this object a plate of gold is placed at the bottom of the vessel, and connected by a suitable arrangement of wires with a galvanic battery.

[Printed, 8*d.*]

A.D. 1854, January 17.—N° 113.

SLOPER, Bevan George.—"Improvements in machinery or "apparatus for separating gold from earthy matters." The earthy matters containing gold are mixed with water, and are introduced into one end of a revolving hollow cylinder, formed of "stabbed metal," the rough surface being inwards. A number of projecting spikes are fixed in the cylinder, and as it revolves the auriferous matters are well mixed with water, and are carried to the opposite end of the cylinder. There they are allowed to pass through holes of various sizes, and are afterwards sorted, by means of annular compartments, formed between the revolving inner case and an outer fixed one. The annular compartments communicate with funnel-shaped receivers, as described in the drawings, and the particles are thereby separated according to their sizes.

[Printed, 8*d.*]

A.D. 1854, January 19.—N° 126.

BURSILL, George Henry.—" Improvements in operating " upon metalliferous ores and other minerals." The ores are pulverized, and mixed with solutions of mercury, or of salts of mercury, or other suitable solutions, by preference, corrosive sublimate, dissolved in about 12 parts of water.

Sulphuret ores are pulverized, and mixed with pumice and smelted.

In melting ores minerals are used as fluxes, which contain a large per centage of soda or potash, as fluor spar.

Rolling and other machinery is described for crushing ores.

[Printed, 5*d.*]

A.D. 1854, January 20.—N° 140.

CHASE, Oliver Rice.—" Pulverising machinery." The ores to be crushed are fed from a hopper into a series of rotating cells. Each cell, as it passes the feeding hopper, receives a proper quantity of material for the action of one stamper. " The mate- " rials remain in the cell during one revolution of the machine, " in which time they receive several blows from the stamper." The crushed powdered matters are thrown through a hole in the bottom of the mortar, and the cell is again filled.

[Printed, 1*s.* 7*d.*]

A.D. 1854, January 23.—N° 167.

WESTLAKE, John.—" Pulverizing, washing, separating, amal- " gamating, and otherwise treating ores," &c. The ores are crushed and amalgamated in cast-iron circular vessels, in which suitable heavy rollers are made to revolve.

The vessel is surrounded by a frame or casing, which may be used like a furnace for applying heat, and assisting the amalgamating process."

[Printed, 10*d.*]

A.D. 1854, January 23.—N° 172.

BROOMAN, Richard Archibald.—" Improvements in ex- " tracting copper from the ore."—(*A communication.*) Copper ores are crushed and mixed with ammonia and water. About a

ton of ore may be mixed with 15 to 20 cwt. of water, and a quantity of ammonia suited to the quality of the ore, but not greater than 25 per cent. of the water. The ore and liquid are placed in a suitable vessel, and agitated by means of steam or other power. Currents of air are injected into the agitated liquid, and oxide of copper will be held in solution. After 6 or 8 hours the liquid is drawn off and evaporated, leaving "pure oxide of copper." "The " ammonia may be recovered with little loss by the processes " ordinarily employed for its recovery."

[Printed, 3*d.*]

A.D. 1854, January 26.—N° 196.

REEVES, Charles, Junior, and WELLS, William.—"An " improvement or improvements in casting metals." "Metals " and metallic alloys are cast with a round and uniform casting, " by" giving suitable motion to the vessel or crucible from which the metal is poured, or to the mould. The object is to keep "the " level of the surface of the metal in the mould as near as is " practicable to the level of the melted metal in the crucible."

[Printed, 8*d.*]

A.D. 1854, January 27.—N° 204.

TENDALL, Henry and TROTTER, William St. Clair.— " Improvements in machinery and apparatus for crushing, washing, " and amalgamating auriferous quartz and other ores." A heavy body, of a conical, semicircular, or other form, having an obtuse convex base, is made to revolve in a suitable closed vessel. The centre of the base works on a short pivot, and the heavy body is tilted on one side, and grinds and crushes by rolling the ores placed on the bottom of the vessel, as it is turned round in the vessel. Suitable amalgamating apparatus, and pipes for introducing and removing the materials are described with drawings.

[Printed, 9*d.*]

A.D. 1854, January 31.—N° 232.

TURNER, Edward William Kemble.—"Treating gold and " other ores." A wedge-shaped or triangular prismoid block is used as a crusher. It has a convex base, and is worked by an oscillating motion, causing " a semi-percussive semi-rotary action."

The crusher works upon a suitable bed plate, which may be flat, or for gold ores concave. Suitable wire or other screens are attached thereto, and suitable amalgamating apparatus, which may be heated by a steam jacket.

The amalgam is strained by placing it upon chamois leather, upon the perforated lid of a vessel, and producing a vacuum below by suitable exhaust apparatus.

[Printed, *4d.*]

A.D. 1854, January 31.—N° 240.

WRIGHT, William and BROWN, George.—" Improvements " in cupolas, which improvements are also applicable to smelting " and other furnaces." Furnaces are made to heat their own blast. The lower part of the furnace or cupola is formed " with " receiving chambers, so contrived that they may hold a mass of " melted metal," received or descended from the furnace or cupola, which acts " as the heating surface for the cold air supply." As applied to smelting or blast furnaces, " the cold air is first " blown into the lower part of the body of the furnace, and it is " then passed into the heating chambers," and afterwards conveyed into the furnace " at a level slightly above that of the blast " hole."

[Printed, *9d.*]

A.D. 1854, February 1.—N° 246.

CHENOT, Claude Bernard Adrien. — " Improvements in " accumulating, conducting, and treating gases of combustion, and " also in generating and applying the same to metallurgic and " other purposes." The specification is a long one, and describes fully the various processes and apparatus employed in collecting and storing in gas-meters the gases of combustion given off from furnaces, ovens, &c., in metallurgical operations.

The gases are " enriched by means of precipitation and decan- " tation, for the purpose of first obtaining pure carbonic acid, " and abstracting nitrogen and obtaining pure oxyd of carbon."

The gases are proposed to be stored in large receptacles, and used by means of pipes for heating surfaces and smelting and working metals.

[Printed, *1s.*]

A.D. 1854, February 1.—N° 253.

ROBINSON, ALBERT.—" Improvements in preparing composi-" tions for coating iron and other ships' bottoms, and other " surfaces." Plumbago is combined with gums or resinous substances, gutta percha, caoutchouc, or other easily fusible media, and the compound is applied as a protecting coating to metallic surfaces and ships' bottoms.

[Printed, 3*d.*]

A.D. 1854, February 2.—N° 262.

WATSON, HENRY.—" Improvements in the working of brass " and copper into forms, and planishing them." Self-acting hammering and planishing apparatus is described with drawings. The hammers work vertically in guides, and are actuated by cams.

India-rubber springs are used for adjusting and regulating the action of the hammers.

[Printed, 6*d.*]

A.D. 1854, February 2.—N° 263.

PARIS, CHARLES EMILE.—" Certain improvements in covering " with metals certain metallic surfaces."—*Provisional Protection only.* Articles of metal which have been coated with a vitreous compound, receive a second coating of metal, by applying the metal thereto in the form of sheets or powder, and fusing it.

[Printed, 3*d.*]

A.D. 1854, February 3.—N° 269.

COLLETTE, CHARLES HASTINGS.—" An improved method of " reducing ores."—(*A communication.*) The ore to be reduced is placed in a closed retort, which is heated to redness. " Reduc-" ing gases such as hydrogen, carbonic oxide, or carburetted " hydrogen having been prepared, are introduced into the retort, " and made to pass through the contents, and the gaseous pro-" ducts allowed to leave the retort."

[Printed, 3*d.*]

A.D. 1854, February 7.—N° 301.

POPE, Abraham.—" Improvements in machinery for crushing, " grinding, amalgamating, and washing quartz, or matters con- " taining gold."—*Provisional Protection only.* The quartz or other ores are crushed between rollers, two or more pairs, and are then ground and amalgamated between horizontal grinding surfaces. The crushed matters with water pass into a surrounding trough, and are filtered and strained. Exhaust apparatus is used for straining the mercury amalgam.

[Printed, 3*d.*]

A.D. 1854, February 11.—N° 338.

GETTY, John.—" An improved mode of plating iron vessels." —*Provisional Protection only.* Plates are to be laid on ships in double layers. The second layer is made to break joint or cover the joints of the first layer.

[Printed, 3*d.*]

A.D. 1854, February 13.—N° 352.

NEWTON, Alfred Vincent.—"An improved mode of pro- " tecting iron from oxidation."—(*A communication.*)—*Provisional Protection only.* Plate iron is covered with a solid carbonaceous coating, by applying thereto a mixture of ground plumbago, pulverized charcoal, bituminous matter, lamp black, water, or weak spirits or vinegar.

Heat is applied to the plate, and it is then passed between rollers.

[Printed, 3*d.*]

A.D. 1854, February 18.—N° 394.

BRITTEN, Bashley.—"Improvements in crushing, pulverising, " and washing mineral earths or ores, and amalgamating the " gold and silver contained therein," &c. A pear-shaped crusher is made to work with the narrow end downwards, in a circular vessel, having in its bottom a circular channel or groove, and a raised centre part.

The grinding and rubbing motion of a pestle is thus obtained. The circular groove is filled with mercury, and heat may be applied. Suitable pipes are employed for supplying and carrying off the materials and water.

An amalgamator is described, in which the crushed materials are supplied from an elevation through a pipe, which has a long narrow orifice. The water and crushed ores are forced in a flattened thin sheet down into and up through a trough of mercury at one end, and pass out at the other end of it.

[Printed, *7d.*]

A.D. 1854, February 20.—N° 395.

HILL, John Reed.—"Improvements in machinery for pulveriz- "ing metallic ores or other similarly hard substances."—*Provisional Protection only.* Two or more conical runners or revolving crushers are proposed to be used in connection with a horizontal bed plate, having an inclined depression, corresponding with the conical shape of the runners.

Suitable washing and amalgamating apparatus may be combined with the crushing machinery.

[Printed, *5d.*]

A.D. 1854, February 21.—N° 413.

JONES, Stopford Thomas.—"Improvements to reduce and "wash minerals to extract metal therefrom, especially gold."—*Provisional Protection only.* An iron vessel about five feet in diameter at the top and four feet at the bottom is to be used. It has a concave bottom, on which a revolving crusher works, with an up and down motion.

Quicksilver is placed in the bottom of the pan, and suitable amalgamating apparatus is connected therewith."

[Printed, *3d.*]

A.D. 1854, February 23.—N° 440.

FOARD, Edward.—"Improvements in furnaces."—*Provisional Protection only.* A casing or partly enclosed chamber is formed in the front of the furnace, and is to be used in heating air, which is conveyed thence through suitable passages into the furnace.

[Printed, *3d.*]

A.D. 1854, February 24.—N° 446.

COWPER, Charles.—" Improvements in furnaces."—(*A communication.*) A furnace for smelting ores is described, with drawings. One or more double grates are used. The upper grate has hollow fire bars through which heated air passes into the furnace. The fuel which falls through the upper grate continues to burn on the lower grate, and heats the grate above. The melted slag may be allowed to pass off through a tube, situated between the two grates, and heated thereby. Carburetted hydrogen gas may be injected into the furnace. Several fire places may be used.

[Printed, 10*d.*]

A.D. 1854, February 27.—N° 473.

BUSSY, Charles de.—" Improvements in machinery or appa-" ratus for the amalgamation of gold ores."—*Provisional Protection only.* The quicksilver is to be placed in "a revolving vessel of a parabolic section." As it rotates "the centrifugal force " causes the mercury to rise up its sides in the form of a thin " film." Crushed ores in the form of mud are placed on the conical top of the vessel, and pass through an annular opening round it into the vessel, and meet and mingle with the quicksilver which takes up the gold, while the waste falls down and passes away.

[Printed, 3*d.*]

A.D. 1854, February 27.—N° 475.

BROOMAN, Richard Archibald.—" An improvement in the " manufacture of tin foils or sheets."—(*A communication.*) Lead is combined with tin mechanically, a sheet of or sheets of tin being laid on an ingot of lead, of the thickness sufficient to cover the surface of the lead, and become extended evenly therewith as it is rolled out. The exposed surface will thus consist always of pure tin, while the inside consists of lead.

[Printed, 3*d.*]

A.D. 1854, February 28.—N° 482.

REHÈ, John Henry.—"Improvements in machinery or appa-" ratus for mixing, washing, crushing, &c., ores, &c." A metal

cylinder is used, "the interior of which is formed into a series of "angular projections." Beaters or crushers are attached to arms which turn on a central shaft. The arms are made elastic, so that the beaters adapt themselves to the inclines of the angular projections as they turn round, and so crush and wash ores, &c.

[Printed, 7*d.*]

A.D. 1854, March 6.—N° 538.

NIVELLES, THIERRY HUBERT DE.—"Certain apparatus for "separating metallic from earthy and other substances, and for "classifying metallic substances, according to their specific "gravities." The earthy and metallic substances or ores are pulverized, and introduced into a conical vessel, containing water. Rapid rotatory motion is given to the vessel, and when all th particles are in a state of suspension the vessel is stopped, and a valve is withdrawn, and the metallic particles are allowed to descend into a long tube filled with water. As the particles descend those that are heaviest fall with the greatest velocities, and by means of suitable apparatus they are sorted according to their specific gravities.

[Printed, 7*d.*]

A.D. 1854, March 6.—N° 542.

BROKENSHAR, BENJAMIN.—"An improved amalgamator." — *Provisional Protection only.* The amalgamating vessel is provided with a central shaft, carrying arms, to which are fixed vertical teeth. Self-acting apparatus constructed on the ball-tap principle is to be employed for regulating the supply of crushed ores and water to the vessel.

[Printed, 3*d.*]

A.D. 1854, March 8.—N° 553.

COOKSON, WILLIAM ISAAC.—"An improvement in the reduc-"tion of lead ores." The lead ores are mixed with metallic iron, or oxide of iron, or iton pyrites, and a small quantity of alkali, or neutral salt, and carbonaceous matter, and heated in a furnace or crucible. The lead is thereby reduced to a metallic state, and sulphuret of iron is formed, which is worked up with water to a

thick paste, and calcined. Oxide of iron, containing sulphur, lead, and some salts, is formed, and may be used again for combination with the lead ores.

[Printed, 3*d.*]

A.D. 1854, March 15.—N° 622.

TRUEMAN, Alfred.—"An improved furnace for the calcina-" tion of copper ores, and other mineral substances." Several retorts or tubes are arranged side by side on the same level, they are all connected together, and are heated by a fire placed at one end of the series of retorts, the flames from which pass under and over each retort. Inside each retort is an endless screw, so that the materials placed in the first retort, furthest from the fire, are passed on by the action of the screw to the next one, until they gradually reach the retort next to the fire place, and are thus gradually heated and calcined.

[Printed, 1*s.* 10*d.*]

A.D. 1854, March 16.—N° 631.

EMERSON, Frederick William.—"Improvements in ma-" chinery for pulverizing, washing, and amalgamating quartz and " matters containing gold and silver." A circular trough or cylinder, having a bottom or periphery formed of two inclined surfaces, is made to revolve on a horizontal axis. In the sides of the trough some inches from the periphery, are gauze or wire sieves. Rollers or runners of a double conical shape, to fit the trough work inside it, and crush and amalgamate the ores as it revolves.

A fixed trough, placed underneath receives the crushed matters and water as they flow from the circular trough.

[Printed, 6*d.*]

A.D. 1854, March 18.—N° 647.

THORNE, William.—"Improvements in reducing metallic " ores."—*Provisional Protection only.* The ores are to be crushed and amalgamated in an annular trough, to which a rotatory motion is given. Crushing balls work in the trough; they

may be hollow, and filled with quicksilver. Currents of electricity are passed through the ores and quicksilver during the process, by means of wires connected with a battery.

[Printed, 3*d.*]

A.D. 1854, March 20.—N° 650.

HODGE, PAUL RAPSEY.—" Improvements in reducing metallic " ores."—*Provisional Protection only.* The ores are to be crushed in a revolving vessel, in which crushing balls work. Quicksilver may be introduced therein, and the vessel may be heated by annular steam or hot water pipes.

[Printed, 3*d.*]

A.D. 1854, March 20.—N° 658.

CHENOT, CLAUDE ADRIEN BERNARD.—" Improvements in the " manufacture of steel, iron, and different alloys, cast, welded, and " moulded." Ores and alloys containing iron are sorted by means of apparatus consisting of electro magnets.

The ores are reduced to a state of "metallic sponge," by the use of "carbonic oxyd," and are treated by a variety of processes, of which ten are described.

[Printed, 6*d.*]

A.D. 1854, March 20.—N° 659.

WEBB, WILLIAM LOCOCK.—" Improvements in pulverizing, " washing, and amalgamating quartz, and matters containing " gold and other metals.—*Provisional Protection only.* A barrel or cylinder is used, having two or more hollow channels, in each of which a ball or balls, or other rolling surfaces may be made to work. The barrel revolves on hollow bearings or axles, through one of which the ores and amalgamating matters are introduced, while the waste matters are withdrawn through the other.

The amalgamated metals are removed by removing a plug or screw fixed in each of the hollow channels.

[Printed, 3*d.*]

A.D. 1854, March 23.—N° 688.

NEWMAN, JAMES.—" Improvements in the manufacture of " metallic tubes." A billet or short cylinder of iron, copper, or

brass is filled with sand, which is dried and rammed hard, and soldered or plugged in. The billet is then heated and drawn into a tube by passing it through grooved rollers, and the sand is afterwards drilled out.

[Printed, 4*d.*]

A.D. 1854, March 28.—N° 716.

FRANCIS, HENRY.—" Improvements in machinery for crushing, " grinding, washing, and amalgamating quartz and other mat- " ters containing gold or silver." A circular trough or channel is used; it is supported on friction rollers and rotates thereon. Inside the trough, which is deep, works a crushing roller, and water and quicksilver are introduced as required, and are withdrawn by suitable outlets.

[Printed, 9*d.*]

A.D. 1854, March 30.—N° 732.

CRAMPTON, THOMAS RUSSELL.—" Improvements in crushing, " washing, and separating ores and minerals." — *Provisional Protection only.* A hollow drum or segment of a drum is to be used, inside it a crushing ball or other suitable form of weight is placed; the drum is made to rock, roll, or turn on its bearings, the ball or weight will remain at, and " substantially do the work " required at the lowest part of the drum." The quicksilver and water, warm or cold, may be introduced, and be amalgamated or mixed with the crushed ores.

[Printed, 3*d.*]

A.D. 1854, April 1.—N° 751.

JOHNSON, WILLIAM.—" Improvements in the treatment or " reduction of metallic ores and salts."—(*A communication.*) It proposed to employ the metallic vapours of cadmium, zinc, and mercury in the reduction of the ores and salts of magnesium, aluminium, sodium, potassium, and other earthy and alkaline metals.

[Printed, 3*d.*]

A.D. 1854, April 1.—N° 754.

BROCKELBANK, GEORGE. — " Improvements in obtaining " metals from ores."—*Provisional Protection only.* The ores are *to be crushed* by a series of stampers actuated by cog wheels.

Below the stampers is a trough with inclined sides, in which the ores are crushed and amalgamated with quicksilver, and washed with water."

[Printed, 3*d*.]

A.D. 1854, April 4.—N° 766.

HIGGIN, JAMES.—"Improvements in the mode or method of "separating metals from each other when in conjunction, and in "obtaining useful products therefrom." Tin scrap is treated in a suitable cistern, with muriatic acid and water, by preference mixed with substances producing chlorine. 16 cwt. of muriatic acid, 1¾ cwt. of nitrate of soda, and 320 gallons of water, form a suitable dissolving mixture; the tin is dissolved therein, and is precipitated by means of powdered chalk. Ammonia may be obtained as a bye product. Where chlorine gas may be conveniently used it is heated by passing it through heated stone pipes, and dried by passing it over dry chloride of calcium; it is then introduced among the tin scrap in a closed vessel. The tin is removed as a bichloride of tin, and may be condensed in water.

[Printed, 4*d*.]

A.D. 1854, April 7.—N° 806.

MOSS, HENRY.—"An auriferous quartz washing, pulverizing, "crushing, seperating, and amalgamating machine."—*Provisional Protection only*. A crusher having a revolving and oscillating motion is to be worked in a stationary pan or vessel. The motion is to be given "from an upright shaft through an eccentric crank "and universal joint."

[Printed, 3*d*.]

A.D. 1854, April 7.—N° 817.

JOHNSON, JOHN ROBERT.—"Improvements in the manufacture of type and other raised surfaces for printing." Alloys of antimony and tin, with tin in excess, are used for forming type so hard and enduring that it may be used as a punch for ordinary type metal.

75 parts tin, and 25 antimony form the best alloy; if lead be used not more than 50 parts of lead to 101 parts of the combined metals should be employed.

[Printed, 3*d.*]

A.D. 1854, April 8.—N° 830.

WILLIAMS, WILLIAM, and WILLIAMS, THOMAS EVAN.— "Improvements in reverberatory furnaces." Several reverberatory furnaces are arranged together, and are heated by a common fire. The fire place is made with three bridges, one at each of three of its sides, each bridge communicates with a furnace. The flues are so arranged that heated air is introduced, and cold air is excluded.

[Printed, 6*d.*]

A.D. 1854, April 8.—N° 832.

MOAT, WILLIAM CROFTON.—"A machine for crushing pul-"verising, and amalgamating." — *Provisional Protection only.* A drum or cylinder having flanges is used, and inside it a conical or plain crushing roller is to be made to work in a contrary direction to that in which the drum rotates. The drum is to be supported by, and revolve upon "two or more rollers placed so as "to bear it."

[Printed, 3*d.*]

A.D. 1854, April 11.—N° 845.

LAVENDER, EDWARD.—"Improvements in apparatus for stir-"ring and acting on matters subjected to heat in retorts." Retorts for calcining or roasting metals are made to revolve on a vertical axis. Arms or blades are attached to the axis, and, as the retort turns, stir and agitate its contents.

Suitable outlets and pipes are connected with the retort for carrying off, and collecting vapours or fumes."

[Printed, 1*s.* 8*d.*]

A.D. 1854, April 11.—N° 848.

MITCHELL, JOHN.—"Improvements in machinery for pulveri-"zing, grinding, amalgamating, and washing ores." Four or *more crushing* balls work in a circular vessel. The balls are each

pushed round by an arm radiating from a central vertical shaft, on which a cone slides free, or inclined surfaces may be used, the smaller ends turned towards the central shaft. The cone, as it urges the ball, tends to make it rotate, and presses it towards the centre, counteracting its centrifugal action.

Rakes corresponding in form with that of the vessel are attached to the arms.

[Printed, 6*d.*]

A.D. 1854, April 19.—N° 905.

BROOMAN, RICHARD ARCHIBALD.—" Improvements in sepa-" rating substances of different specific gravities, and in ma-" chinery employed therein."—(*A communication.*) The auriferous sands or deposits are placed in a closed box on a sieve or perforated screen. Currents or blasts of air are made to pass up and through the sands and raise them from the sieve. As they fall the heaviest particles, consisting chiefly of the gold will fall first. The metal will thus be found in the lowest stratum after the requisite number of blasts have been passed through, and the particles of gold are then easily separated from the sand.

[Printed, 8*d.*]

A.D. 1854, April 20.—N° 907.

HUNT, EDMUND.—" Improvements in treating minerals for the " extraction of their valuable metals." — *Provisional Protection only.* The mineral from which the metal is to be separated is to be put in a reverberatory, furnace, and when heated is plunged into water. It is thus rendered friable. It is then crushed in a ball crushing machine, and operated upon by the amalgamating or other suitable process.

[Printed, 3*d.*]

A.D. 1854, April 20.—N° 911.

REED, JOHN MONTGOMERY.—" Improvements in the treatment " of amalgams."—*Provisional Protection only.* The improvements are stated to consist " in the application of electricity so " as to separate the solid metals from the mercury, and render " their extraction easy; also to purify them and free them from " dross and scoria."

[Printed, 3*d.*]

A.D. 1854, April 21.—N° 919.

COLLYER, Robert Hanham.—"Improved machinery for "crushing or triturating hard substances."—*Provisional Protection only.* One or more heavy rollers, cylinders, or segments of cylinders, having plain or fluted surfaces, may be made to oscillate in a concave bed, by means of a crank or other suitable motion, and act as crushers. Ores or other substances are triturated and rubbed to powder by the action of the crushers.

[Printed, 3*d.*]

A.D. 1854, April, 22.—N° 925.

MOUCHEL, Pierre Jean Felix.—"Improvements in melt- "ing and in treating the ores and metals." The ores and fuel are crushed, and are introduced in a powdered state into the smelting furnace with the air blast.

The heat from the furnace is applied to heat a suitable calcining chamber, and so calcine the ores and prepare them for being pulverized.

The ores are placed in a suitable carriage, and introduced by means of an alternating platform, into the calcining chamber or furnace; the platform turns and brings out one carriage while it introduces another ready charged.

[Printed, 7*d.*]

A.D. 1854, April, 27.—N° 951.

PERSON, Charles Cleophas.—"Certain improvements in "coating with zinc by galvanization."—*Provisional Protection only.* The process is called "voltaic zincage by the help of "alumina," which acts in the electrolytic bath as a medium, and facilitates the reduction of zinc. "The alumina is introduced into "the bath either as a haloid salt or as a double or single acid salt. "Alum, chloride of aluminum, or sulphate of alumina, may be "used."

"100 parts water, 10 parts crystallized alum, and 1 part oxide "of zinc" are proportions recommended.

[Printed, 3*d.*]

A.D. 1854, April 28.—N° 963.

TIZARD, William Littell.—"Certain apparatus for roasting "and calcining ores and minerals, and separating metals there-

" from," &c.—*Provisional Protection only.* The ores, especially those containing gold, are crushed between rollers, and are then to be fed upon a spiral perforated floor, which works round a vertical axis in a suitable upright shaft or cylinder. The heat from a fire or furnace, placed at the bottom of the shaft, is made to act upon the crushed ores as they are gradually shaken down the spiral floors. They are then cooled with water, and are so purified from "arsenic, antimony, lead and tin, or other " metals, and are in a fit state to be operated upon by the amal- " gamating process."

[Printed, 3*d*.]

A.D. 1854, May 1.—N° 976.

HAMILTON, James.—" Improvements in machinery for crush- " ing quartz and other substances." Auriferous quartz is crushed in a basin having fluted or corrugated sides, gradually diminishing in size as they approach the bottom. A cylindrical pestle, worked by a crank motion, and having fluted sides corresponding to those in the basin, works therein, and is adjusted to the required hight by means of suitable adjusting screws.

[Printed, 7*d*.]

A.D. 1854, May 2.—N° 982.

TRUEMAN, Alfred.—" Improvements in the manufacture of " sulphuric acid whon roasting copper ores," &c. The sulphurous acid gas resulting from the roasting of copper ores is mixed with oxygen or atmospheric air, and brought into contact with heated platinum, oxide of iron, or other substances which in a heated state cause oxygen to combine with the sulphurous acid and form sulphuric acid.

Platinum, in the form of coils of wire, and pumice stones or other porous substances, may be placed in suitable pipes or passages through which the sulphurous acid gas is passed.

[Printed, 4*d*.]

A.D. 1854, May 5.—N° 1010.

WARNER, Arthur.—" Improvements in the manufacture of " metal sheets for sheathing ships," &c.—Sheets of zinc, which

have been previously coated with lead or tin, receive a second coating of copper or its alloy. The compound sheet so formed is used for sheathing ships, &c.

[Printed, 3*d*.]

A.D. 1854, May 6.—N° 1018.

DREWE, HENRY GREGORY.—" Improvements in obtaining " metal from ores." Crushers are made to slide, without rolling or turning on axes, in an annular groove or channel. Ores and water are supplied to the groove or channel by suitable apparatus. The purverized ore is amalgamated by passing it through mercury either by means of the pressure of a column of semi-fluid matter, or by the action of a force pump, or by other convenient means.

[Printed, 9*d*.]

A.D. 1854, May 10.—N° 1044.

ANTHONY, JOHN, and CHAFE, WILLIAM TREEBY.—" An " improvement in machinery for the manufacture of pipes and " tubes from lead and other soft metals and alloys." This consists in the combination of two or more dies or mouth pieces, with core bars to fit them; they are fed from a common cylinder or reservoir. Several pipes or tubes are made at the same time by the apparatus described.

[Printed, 8*d*.]

A.D. 1854, May 18.—N° 1112.

JOHNSON, WILLIAM.—" Improvements in the treatment and " manufacture of metals and metallic ores."—(*A communication.*) —*Provisional Protection only*. It is proposed in melting metals to use " a rotatory helical cone blower," for delivering the blast to furnaces.

Chlorides of iron, and manganese, and alumina, fluorides, ferrates, and manganates of soda and potash, &c. are, it is stated in general terms, to be combined with various metals.

[Printed, 3d.]

A.D. 1854, May 18.—N° 1115.

BARLOW, CHARLES.—" Improvements in the manufacture of " metallic capsules for covering or securing bottles and other " vessels."—(*A communication.*) Machinery for making capsules is described with drawings. Discs of tin or other metal or alloy are held to or against mandrils, which are made to rotate rapidly, and so form the discs into capsules.

[Printed, 7*d.*]

A.D. 1854, May 26.—N° 1176.

GOSSAGE, WILLIAM.—" Improvements in smelting or reducing " copper ores and certain other metallic compounds."—*Provisional Protection only.* Copper ores are calcined and heated in a chamber connected with the smelting furnace to which they are to be directly transferred in a highly heated state, thereby effecting economy in fuel. Sulphuret of calcium and oxide of iron, waste products rejected by the alkali makers, are "metallic compounds" which may be advantageously melted "to produce sulphuret of " iron in the state of regulus."

[Printed, 3*d.*]

A.D. 1854, June 19.—N° 1331.

WESTLAKE, JOHN.—" Improvements in treating the pulverized " solution obtained from machines used for crushing ores, gossans, " earths, and rocks."—*Provisional Protection only.* The ores when pulverized are to be introduced into a vessel heated at the bottom by a fire. They are then amalgamated with mercury by means of a revolving agitating apparatus.

[Printed, 3*d.*]

A.D. 1854, June 21.—N° 1356.

McINNIS, JOHN.—" An improved composition for coating the " bottoms of iron ships," &c. A "metallic soap" is formed by dissolving pale yellow soap in water, and adding thereto a solution of a metallic salt, by preference, sulphate of copper (40 parts to 100 parts of soap). Arsenic, oxide of mercury, and other poisonous substances may be mixed with the metallic soap, which is applied to ships' bottoms to prevent incrustation.

[Printed, 3*d.*]

A.D. 1854, June 22.—N° 1370.

BROWN, William Henry.—" An improvement in the con-" struction of furnaces for the melting of steel and other metals " requiring a crucible in the melting thereof."—*Provisional Protection only.* A moveable crucible is proposed to be employed. It is attached to a carriage, which is run (on wheels or rollers) into the furnace. When it is withdrawn, the crucible, which is supported on the carriage on suitable axes or bearings, is tilted and emptied.

[Printed, 3*d.*]

A.D. 1854, June 22.—N° 1376.

PRICE, Astley Paston.—" Improvements in the treatment of " certain alloys of tin." Alloys, consisting of tin and the precious or other metals, especially " Australian auriferous tin," are subjected to the action of hydrochloric acid. This dissolves the tin, and forms chloride of tin, which is recovered by evaporation. The residue, containing gold mixed with tin or other metals, is boiled with nitro-hydrochloric acids, and the various metals are separated by the usual processes. The auriferous tin may be dissolved in nitro-hydrochloric acid, and nitro-muriate or bi-chloride of tin is obtained. Or the tin alloys may be treated with nitric acid, and binoxide of tin will be obtained.

[Printed, 4*d.*]

A.D. 1854, June 22.—N° 1377.

PRICE, Astley Paston.—" Improvements in the purifica-" tion of tin, and in obtaining useful products arising from such " purification." Tin is purified or separated from the ores of gold, silver, copper, lead, tungsten, zinc, or iron, with which it may be combined, by subjecting the impure tin to the action of hydrochloric acid, and decomposing the solution of chloride of tin by waste gas or other ammoniacal liquor or ammonia.

Muriate of ammonia is thus obtained, and the oxides or other compounds of tin are calcined, and treated by the ordinary methods to produce metallic tin.

Sulphurous acid or carbonate of lime or of magnesia may be used for decomposing the chloride solutions of the impure tin.

Lead is precipitated by means of sulphuric acid.

[Printed, 4*d.*]

A.D. 1854, July 4.—N° 1471.

JOHNSON, John Henry.—"An improved system or mode of "coating iron with copper."—(*A communication from Edmond Charles Bocquet of Corbehem, France.*)—*Provisional Protection only.* The iron surface is first covered with a thin protecting coating, by preference of lead. It is then to be coated with copper in a bath of sulphate of copper.

The surface is prepared for the coating process by dipping it in an acid solution, and washing it and then dipping it in a lye of caustic soda, and lastly allowing it to lie in lime for several weeks.

[Printed, 3*d.*]

A.D. 1854, July 7.—N° 1493.

LACEY, William.—"A new or improved method of making "copper rollers, cylinders, and tubes." Old copper printing rollers are combined. The patterns are removed by turning, and one roller is introduced inside the other. The two are heated and passed through rollers, and by drawing and rolling are joined together, and are, if required, made into tubes.

[Printed, 5*d.*]

A.D. 1854, July 15.—N° 1561.

HUNT, William.—"Improvements in utilizing certain com-"pounds produced in the process of galvanizing iron, and in the "application of the same and similar compounds to certain "useful purposes."—*Proisional Protection only.* Chloride of zinc is to be used instead of sal ammoniac as a protecting flux or stratum for the bath of molten zinc used in coating metals. The chloride of zinc when skimmed off may be recovered, and again used.

Sulphuric acid used in cleansing the surfaces may also be recovered by boiling and distillation.

[Printed, 3*d.*]

A.D. 1854, July 15.—N° 1563.

WAGSTAFFE, Matthew French, and PERKINS, John William.—" Improvements in obtaining metals from ores and " oxides." Metallic rock or ores are pulverized, and the metallic oxides they contain are dissolved in suitable acids, as sulphuric, nitric, or hydrochloric, or their mixture

Sulphurets of the metals are crushed and calcined, and plunged red hot into the acids or mixtures.

Carbonates of soda or potash are used to precipitate carbonates of the metals. These are treated by the ordinary processes of purification, or are dissolved to form solutions, whence the metals are deposited by the ordinary processes of electro-metallurgy.

[Printed, 3*d.*]

A.D. 1854, July 18.—N° 1582.

MOREAU, Peter Armand Le Comte de Fontaine.—" Im- " provements in zincography."—(*A communication.*)—*Provisional Protection only.* A drawing or pattern is made on the surface of a zinc plate, in suitable lithographic ink or other material. Powdered resin or asphalte is sprinkled thereon and heated, and forms a projecting coating.

The plate is placed with another of similar size in a solution of sulphate of zinc, and connected with a battery. The plate with the drawing serves as anode, and the unprotected parts thereof are bitten out, leaving the pattern or drawing in relief.

[Printed, 3*d.*]

A.D. 1854, July 25.—N° 1632.

SPENCE, Peter.—" Improvements in obtaining sulphur from " iron pyrites and other substances containing sulphur, and in " apparatus for effecting the same." Iron pyrites and sulphuret, copper ores and other sulphurets are exposed to the action of heat in closed chambers. Sulphurous acid gas is evolved, and is brought into contact with carbonaceous matters, as coke, charcoal, peat, or other deoxydizing substances, at a red heat. The gas is decomposed, vapour of sulphur is eliminated, and is passed into a closed chamber where it is cooled, and sulphur is deposited.

[Printed, 6*d.*]

A.D. 1854, July 26.—N° 1644.

PONTIFEX, Edmund Alfred, and GLASSFORD, Charles.—"Improvements in obtaining soft lead from hard lead, for the "separation of the impurities in hard lead, and for the separation "of antimony from these impurities." Hard "Spanish" or "German" lead, or hard crystalline lead, which is usually combined with antimony, silica, copper, tin, arsenic, and sulphur, is melted in an ordinary furnace. A mixture consisting of 3 parts by weight of nitrate of soda, 4 parts of soda ash, and 4 parts of caustic lime, is mixed with the melted lead if it contain from 5 to 15 per cent. of antimony. If the lead contain less antimony, and ½ to 1½ per cent. of silica, equal parts of soda, ash, and caustic lime may be used.

The lead is purified, and soft ductile lead is obtained by skimming the dross from its surface, and sprinkling thereon a covering of the mixture, and repeating the process at intervals.

From 40 to 60 lbs. of the mixture may be used with 9 or 10 tons of lead.

The dross may be reduced in the ordinary way, or treated with boiling water, which will remove "all but oxides of antimony and "lead." The oxide of lead is dissolved out by nitric acid, leaving antimony, which is recovered by the ordinary method.

[Printed, 4*d.*]

A.D. 1854, August 1.—N° 1693.

McGAFFIN, John.—"An improvement in the manufacture of sheet metal pipes." Sheet metal is corrugated and coated with zinc. The corrugated sheets are formed into cylinders, which are rivetted together, or otherwise joined. The corrugated channels are in the circumference of the tube.

[Printed, 5*d.*]

A.D. 1854, August 18.—N° 1806.

HILL, John Reed.—"Improvements in machinery for pulve-"rizing metallic ores, or other similarly hard substances."—*Provisional Protection only.* It is proposed to use conical crushing rollers which revolve on a bed plate, which has a depression corresponding with the form of the rollers.

[Printed, 5*d.*]

A.D. 1854, August 21.—N° 1835.

SMITH, WILLIAM HENRY, BESSEMER, HENRY, and LONGSDON, ROBERT.—" Improvements in the manufacture " and treatment of slag and vitreous substances, and the com- " bination of other substances therewith." Slags obtained from melting metals are run in covered gutters made of fire clay, and heated, into suitable pots, to which heat may be applied, and in which the slags are allowed to settle and throw impurities up to the surface. Metallic oxides, and alkaline, and saline substances, clay or lime, or glass in a heated state may be mixed with the slags, and cast in moulds in the required forms. Suitable apparatus for carrying on the various processes is described with drawings.

[Printed, 3*s*. 2*d*.]

A.D. 1854, August 21.—N° 1836.

JONES, STOPFORD THOMAS. — "Further improvements to " reduce and wash minerals to extract metal therefrom, especially " gold." A metallic concave pan is described, having a hole through its bottom, in which works a spindle properly packed; on the spindle is mounted a revolving crusher, with a convex bottom. Suitable adjusting apparatus regulates the distance of the crusher from the pan, the spindle is driven by driving gear supported on a bar, which rests on the pan. Suitable amalgamating apparatus is described.

[Printed, 9*d*.]

A.D. 1854, September 7.—N° 1952.

JOHNSON, WILLIAM.—" Improvements in coating iron and " steel wire with other metals or alloys."—(*A communication.*)— *Provisional Protection only.* The wire is first passed through "a " solution of double chloride of zinc and ammonia, or a simple " solution of chlorhydic acid diluted with water." It is then passed through a bath of molten metal, and on emerging is passed through gauges, to remove superfluous coating, and then immediately cooled with jets of water, which process materially improves the appearance of the work.

[Printed, 3d.]

A.D. 1854, September 12.—N° 1986.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—"Improvements in baths or receptacles for melting and containing certain "metals for the purpose of coating other metals."—*Provisional Protection only.* Instead of using metal vessels for containing baths of molten metal for coating surfaces, vessels or chambers constructed of brick, and heated by suitable fire-places and flues, are to be employed.

[Printed, 3*d.*]

A.D. 1854, September 25.—N° 2063.

RUOLZ, HENRI CATHERINE CAMILLE DE, and FONTENAY, ANSELME LOUIS MARIE DE.—"Improvements in the treatment "of certain metals for producing an improved metallic alloy." The specification refers to a former invention described in the specification of Letters Patent of December 30, 1853. (See No. 3026, p. 246.) The proportions therein mentioned may be varied by forming an alloy, of copper as many as 49 parts, nickel 31, and silver from 20 to 40 parts. Phosphorus may be added in casting articles as statuettes, by melting the alloy with a mixture of equal parts of acid, phosphate of lime, and powdered charcoal, brought to a red heat; or with a mixture of 100 parts phosphate of lime, 50 parts sand, 75 borax, and 10 charcoal. 150 parts of mixture may be added to 1,000 parts of the alloys.

Phosphuret of copper is employed by preference; the phosphorus may be subsequently driven off by keeping the metal at a cherry-red heat, with charcoal, in a close vessel for a long period. This process restores the ductility which the phosphorus impairs.

[Printed, 4*d.*]

A.D. 1854, September 26.—N° 2065.

HALSEY, JOSHUA BACHELER.—"An improved machine or "apparatus for crushing and pulverizing ores and for seperating "the gold therefrom by amalgamation." A series of two or more circular troughs or channels are connected concentrically by a strong bed plate. Crushing "edge-runners" working on radial arms springing from a central shaft, pulverize the ores in the outer groove, and suitable scrapers or rakes attached thereto rake

up the ores and prepare them for the runners. The crushed ores are carried by streams of water into the inner channels, and are there amalgamated with mercury. The waste passes off by suitable pipes or outlets at the centre.

[Printed, 4*d.*]

A.D. 1854, October 5.—N° 2145.

BENNETT, THOMAS.—"Improvements in the apparatus em-" ployed in the manufacture of gold, silver, and metal leaf." Self-acting gold beating apparatus is described with drawings. The hammer works vertically in guides, the mould is moved under the hammer by a frame, to which a reciprocating and also a rotating motion is given.

[Printed, 1*s.* 3*d.*]

A.D. 1854, October 7.—N° 2155.

SELBY, GEORGE THOMAS.—"An improvement in furnaces." Furnaces are made with hollow ∩-shaped bars, which are open at the back of the furnace and open at the front into hollow bearers. The bars may be used with all furnaces into which heated air is to be introduced.

[Printed, 6*d.*]

A.D. 1854, October 17.—N° 2218.

CORNIDES, LOUIS.—"An improved apparatus for amalgamating " the gold and silver contained in pulverized ores." Apparatus for amalgamating crushed auriferous or other ores, either by the wet or dry process, is described with drawings. The operation is carried on by means of a gutta percha band, which passes over rollers through quicksilver, " so that finely pulverized metalliferous " ore is carried along between the surface of the band and the " quicksilver, and is brought into contact therewith under pres-" sure."

The apparatus described in a former specification (See *ante*, No. 1625, p. 233) is used with suitable modifications.

[Printed, 7*d.*]

A.D. 1854, October 21.—N° 2247.

EDWARDS, William Alexander.—" Separating iron or steel " from brass, gun metal, and all other metallic filings."—*Provisional Protection.* Filings of brass and alloys are separated from those of steel by the use of electro magnets arranged in a suitable apparatus.

[Printed, 3*d.*]

A.D. 1854, October 25.—N° 2270.

HENDERSON, William.—" Improvements in treating certain " ores and alloys, and in obtaining products therefrom." These relate to modes of separating metals from mixed ores. Silver and gold are separated from copper and other ores containing very little or no arsenic, zinc, or volatile metal, by calcining and adding, " to the calcined ore as much sand, silica, cobbing, or stiff ore " (all free from sulphur), and carbonaceous matter as will be " required to form protosilicates of all the oxides of metals and " earths." Before fusion "from 10 to 15 lbs. of nitrate of soda, or " a proportionate quantity of peroxide of manganese, or other oxydising agent should be added to every ton of calcined ore. The ores and mixture are smelted; if no sulphur be present the precious metals are obtained directly, if it be present, the regulus containing the precious metals is calcined, treated as above described, and melted with about 10 lbs. of lead to every pound of the precious metals. The mixture is tapped, and afterwards refined in the ordinary way. If the ores contain zinc or arsenic, which may be worth recovering, the composition of the ore is ascertained by analysis. If much sulphur be present it is driven off by calcination, until the proportion of sulphur to the metal be about as 1 to 2. The ore is cooled, wet with water, and, exposed to the air for a few days, it is then dried and ground fine. If there be too little sulphur, rich sulphur ores, iron pyrites, or sulphuric acid may be added to the ores. Oxydising agents, alkaline chlorides, are then mixed with the ores, which are calcined in a furnace, as described, and are afterwards put in a tank of boiling water, and treated with moist carbonate or oxide of zinc, and agitated, and allowed to settle. The clear liquor containing " chloride of zinc and alkali, " and sulphate of alkali is run into coolers." The alkaline salts

are "crystallized out, leaving chloride of zinc nearly pure as "mother liquor." This is further purified, and the precipitates are treated and reduced in the ordinary way. A mode of separating deposited oxides of arsenic and zinc, obtained as a by product in the manufacture of sulphuric acid, is also described.

[Printed, 4*d*.]

A.D. 1854, October 27.—N° 2291.

PRICE, Astley Paston.—"Improvements in the calcination "and oxidation of certain metallic, mineral, and metallurgical "compounds, and in the apparatus and means for effecting the "same." Revolving tubes or retorts for calcining or roasting ores are described. They are placed horizontally or inclined, and so constructed and arranged that materials, as ores, metals, alloys, earths, &c. may be subjected to the temperature necessary to effect calcination or oxydation, and be also treated with currents of atmospheric air or steam, or both, at their ordinary or at an elevated temperature.

[Printed, 1*s*.]

A.D. 1854, November 7.—N° 2358.

BIRD, John.—"Improvements in reverberatory furnaces." Furnaces are described with drawings which have two sets of fire bars, one set being horizontal or slightly inclined, the other set, which lies further back being considerably inclined. A closed ash pit is used, and the arch or top of the furnace is made hollow, and the air is heated by being passed through it. Or the air is heated by passing it through passages or flues made in the sides of the furnace.

[Printed, 8*d*.]

A.D. 1854, November 8.—N° 2370.

CHAMEROY, Edme Augustin.—"Improvements in the junc-"tion of sheet metal pipes, and apparatus employed therewith." The junction is formed by frictional contact without screws; soft metal, as lead, tin, zinc, or their alloys, is used "for forming "the junction surfaces." The metal is fused on to the ends of the pipes (by means of suitable iron moulds) in the form of rings, placed externally and internally to fit into each other. They are

slightly conical, and have grooves to receive suitable packing. The joints of the pipes may be covered with a layer of paper soaked in bitumen.

[Printed, 10*d.*]

A.D. 1854, November 9.—N° 2373.

PRETSCH, PAUL.—" Improvements in producing copper and " other plates for printing." The photographic process is applied to produce a raised or sunk design on glass or other suitable surface covered with glutinous substances and the usual photographic materials. A deposit of copper or other metal is applied to the surface so prepared, and a copy thereof is taken in reverse by the deposited metallic surface, and may be used for producing plates for printing.

[Printed, 3*d.*]

A.D. 1854, November 10.—N° 2389.

TURNER, EDWARD WILLIAM KEMBLE.—" Improvements in " separating liquids or fluids from substances," auriferous ores, &c. —*Provisional Protection only*. The specification of former Letters Patent, dated 31st January, 1854, is referred to (See *ante*, No. 232, p. 251). The amalgam or mercury mixed with auriferous ores is strained away therefrom by an exhaust apparatus. The necessary vacuum is created by introducing steam into a suitable vessel below a perforated plate or strainer, containing the amalgamated materials, and condensing the steam by jets of water.

[Printed, 3*d.*]

A.D. 1854, November 13.—N° 2404.

CADDICK, DAVID.—" Improvements in puddling furnaces." —*Provisional Protection only*. It is proposed to construct reverberatory furnaces with a wrought-iron plate on each back and front side, extending from top to bottom and end to end of the furnace, and having suitable openings for flues. The flue leading from the furnace to the shaft has a moveable iron bottom, to enable it to be readily cleaned. Apparatus is applied for throwing blasts of cold air on the hot bed, after the charge has been withdrawn, to cool it.

[Printed, 3*d.*]

A.D. 1854, November 15.—N° 2417.

WARNER, ARTHUR.—" Improvements in combining sheets of " copper or its alloys with lead, tin, zinc, nickle, gold, silver, pla- " tinum, or alloys containing these metals, &c."—*Provisional Protection only.* One surface or sheet of metal or alloy is covered with suitable solder, and another sheet is applied thereto, and heated. Pressure is then applied, and the sheets are thereby united.

[Printed, 3*d.*]

A.D. 1854, December 6.—N° 2561.

MOREAU, FONTAINE PETER ARMAND LE COMTE DE.— " Improvement in coating and coloring metal and alloys of " metals."—(*A communication.*) Metals and their alloys are precipitated in cold solutions, and are deposited on metallic surfaces " without the aid of the battery or poisonous substances."

" Iron is tinned by a salt of tin at its lowest point of oxydation, " and the addition of a smaller quantity of salt of copper," which prevents the deposit from becoming crystalline. By increasing the proportion of salt of copper, alloys of a golden colour, from green to red gold tints, are obtained. " To obtain the precipitates " with brilliancy, it is necessary to employ sulphates, or, by pre- " ference, tartrates of the metals." Brass may be similarly precipitated on iron. Salt of iron should be added to the bath. " The silver plating of iron is effected by chloride of silver dis- " solved in deliquescent concentrated chlorides." "The silvering " of other metals is performed by other cheap metals, to which a " little chloride of ammonium or sal ammoniac is added."

Metals are precipitated on zinc " by means of feeble vegetable " salts, or of mineral salts, dissolved in saturated solutions of salt " of zinc." Other processes of precipitation applicable to various metals are described.

[Printed, 4*d.*]

A.D. 1854, December 14.—N° 2632.

EVANS, LLEWELLYN WILLIAM, and McBRYDE, JAMES.— " Improvements in the burning of sulphuret ores for making

"sulphuric acid and for smelting." Closed kilns for burning iron or copper pyrites are described, with drawings. The necessary air is forced into the kiln by mechanical means, such as a fan and blast apparatus. The kilns may be used for roasting copper ores.

[Printed, 6*d*.]

A.D. 1854, December 26.—N° 2724.

THOMAS, FREDERICK SAMSON, and TILLEY, WILLIAM EVANS.—"An improved process for plating or coating lead, iron, " or other metals with tin, nickel or alumina." The tin solution is prepared by dissolving metallic tin in nitro-muriatic acid, and precipitating by ferrocyanide of potassium. Sulphuric or muriatic acid is mixed "with the precipitated oxide of tin; water is added, and the solution is boiled with a small portion of ferrocyanide of potassium, and filtered.

The acid may be dispensed with, and the solution be treated with "sulphuric acid gas."

The nickel solution is prepared in a similar manner, without the addition of the sulphuric acid or gas.

For alumina, alum is dissolved in water; ammonia is added until the precipitation ceases. The precipitated alumina is washed, filtered, and boiled with cyanide of potassium in distilled water.

[Printed, 3*d*.]

A.D. 1854, December 27.—N° 2729.

DUNN, JOHN LANG.—"Improvements in working up certain " waste sulphates and nitrates, and for the manufacture of useful " products therefrom." Nitrates of copper and iron are formed as waste products in the etching of printing rollers, and sulphate of lead is a waste product in calico printing.

Nitrate of copper is placed in a wooden vat and diluted with water to about 56° Twaddell; 50 per cent. by weight of litharge is added to the liquid, which is allowed to stand for about a week, being well stirred a dozen times a day. When a white deposit of nitrate of lead is deposited, the liquor is drawn off by a syphon. As much molten lead as litharge previously used is added to the liquor.

The liquid in a few days becomes of a light straw colour, and copper is precipitated, and may be "removed, washed, and sold "as copper."

In the case of nitrate of iron, oxide of iron is precipitated by strong liquid ammonia.

Sulphate of lead is dried, pulverized, and mixed with $\frac{1}{6}$ by weight of ground coal, and heated in a reverberatory furnace, and converted into a sulphuret. The sulphuret is treated with $\frac{1}{3}$ its weight of nitric acid; nitrate of lead is obtained, which is crystallised in the usual way."

[Printed, 3*d.*]

1855.

A.D. 1855, January 1.—N° 4.

CRAM, George, and CRANE, John Jackson.—"An improved composition, applicable to the coating of ships' bottoms "and other useful purposes." A protecting composition suitable for coating ships' bottoms, is formed by mixing about—

112 lbs. of dry white lead of commerce,
8 lbs. of dry red lead,
6 lbs. of litharge,
3 gallons of japanner's gold size,
1 gallon of boiled linseed oil,
$\frac{1}{2}$ gallon of spirits of turpentine.

[Printed, 3*d.*]

A.D. 1855, January 3.—N° 18.

JOHNSON, John Henry.—"An improved system or mode of "coating iron with copper."—(*A communication.*) Surfaces of iron are well cleansed by dipping them in acid solutions, then washing them in water, and using alkaline solutions, or a bath of quick lime. Before coating them with sulphate of copper a thin protecting coating of copper, or of lead, is deposited on the iron by immersing it in suitable solutions and using suitable

batteries. This will prevent the sulphuric acid contained in the sulphate from acting injuriously on the iron.

A copper (protecting) solution is formed by dissolving in a pint of water 350 to 400 grains of cyanide of potassium, and adding cyanide of copper until the solution is saturated.

The lead (protecting) solution is formed by dissolving "oxide "of lead in water, holding in solution ten per. cent of potash "until saturation is effected."

The iron, when coated by either of the protecting coatings, is placed in a bath of sulphate of copper, and the required thickness of copper is deposited thereon by the electro process.

[Printed, 4*d*.]

A.D. 1855, January 6.—N° 34.

COOK, Benjamin.—"Certain improved apparatus for separating "filings of iron or steel from other metallic filings." A number of magnets are arranged radially round a cylinder, which rotates on a horizontal axis. Mixed filings are fed upon the cylinder from a hopper, as it turns the iron or steel filings adhere to the magnets, and are carried round by the cylinder, while the filings of copper or its alloys or other metals fall off from the cylinder into a suitable receiver. The iron filings are removed by suitable revolving brushes, before they are carried completely round.

[Printed, 10*d*.]

A.D. 1855, January 13.—N° 93.

NEVILL, William Henry.—"Improvements in the construc- "tion of reverberatory furnaces for the collection and condensa- "tion of volatile substances." When metals that are volatile at high temperatures are submitted to heat in reverberatory furnaces, the rapid currents of heated air passing through the flues cause loss. To remedy this a blast of cold or heated air is introduced at right angles to and above the fire bars.

As much blast may be injected as may be necessary to carry off fumes; and any suitable system of flues, dampers, and collecting chambers in connection with water or coke may be used.

[Printed, 3*d*.]

A.D. 1855, January 13.—N° 99.

PEARCE, JOHN CHARLES.—" Improvements in machinery or " apparatus for the manufacture and working of iron and other " metals." A steam hammer and apparatus for feeding boilers and valves for regulating the supply, are described with drawings.

The hammer works in vertical standards of the usual kind; the steam cylinder is " disposed low down in the framing, and along- " side of the hammer block."

[Printed, 2s.]

A.D. 1855, January 22.—N° 162.

GEDGE, JOHN.—" Improvements in laminating metals, either in " relief or bas-relief."—(*A communication from Messrs. Tournel, frères, of St. Chamond, France.*) Designs or patterns are impressed on the surfaces of metals by passing them through rolling apparatus.

The impressing surfaces are formed on hard metal collars, which are moveable, and may be attached to or disconnected from the spindles of the rolls. Various patterns and designs may be thus made by merely changing the collars.

[Printed, 10*d.*]

A.D. 1855, February 3.—N° 253.

THOMAS, FREDERICK SAMSON, and TILLEY, WILLIAM EVANS.—" Improvements in plating or coating metals." These relate to " making alloys " of silver, tin, copper, and nickel, or two or more of them, and depositing the same on metallic surfaces.

Tin is dissolved in nitro-muriatic acid, and precipitated by ferrocyanide of potassium.

The oxide is washed, and " taken up with ferrocyanide or " cyanide of potassium " boiled in water.

Silver is dissolved by nitric acid, and is precipitated by ferrocyanide of potassium or common salt or any suitable alkali. Pearl ash or ferrocyanide of potassium is " fused with salts of " tartar and ammonia." The " alkali so fo rmed, is " added to the oxide of silver, and boiled with water to form a solution.

Nickel is treated in the same way as silver.

For the upper solution "form a solution of sulphate of copper, then precipitate by salts of tartar, add the alkali formed as above described for silver. Or sheet copper may be used.

To deposit alloys of the metals, the solutions are mixed in the required proportions, and the metals are mixed to form the required metallic alloy, and form the positive pole connected with a suitable battery, or oxides of the metals mixed in proper proportions are suspended in the solutions.

[Printed, 4*d.*]

A.D. 1855, February 5.—N° 272.

CARRÉ, PIERRE JOSEPH.—" Improvements in ornamenting " fabrics with metal leaf."—*Provisional Protection only.* The fabric is cemented or fastened to paper or suitable material, and embossed in pattern by a suitably engraved block. It is then to be printed with a suitable mordant for attaching the metallic leaf. The leaf is temporarily attached to paper, which is then fixed on the block, and pressed on the embossed surface.

Heat is applied, and pressure, and the metallic leaf adheres to the cloth.

[Printed, 3*d.*]

A.D. 1855, February 6.—N° 279.

WARNER, ARTHUR.—" Improvements in coating or combining " sheet iron and steel with sheet lead, zinc, tin, copper, or alloys " of such metals."—*Provisional Protection only.* Sheet iron or steel is proposed to be coated with sheet lead, zinc, tin, or copper or alloys, by introducing soldering metal between them, and applying heat, while the sheets are pressed together by suitable apparatus.

[Printed, 3*d.*]

A.D. 1855, February 13.—N° 333.

DALTON, GEORGE.—" Improvements in reverberatory furnaces." —*Provisional Protection only.* Air chambers are made in the sides and back of the ash pit of the furnace.

Numerous perforations or openings are made to lead into the ash pit. The air passing into the chambers becomes heated, and being " divided into numerous streams materially assist the com- " bustion of the fuel."

[Printed, 3d.]

A.D. 1855, February 21.—N° 390.

LOW, Charles.—" Improvements in extracting gold from its " ores." The auriferous ore is broken small, and calcined to drive off all sulphur. Jets of water or steam are directed into and among the heated ores; the ores are then melted in a reverberatory furnace. About one ton of ore is put into a hot furnace with "about 100 lbs. of fluate of lime." When the ores are fused about " 100 lbs. of lead, litharge, or galena, 50 lbs. scrap or other " iron, and 20 lbs. of peroxide of manganese, and two or three " shovels-full of small coal " are thrown into the furnace. In about three hours the mass will be fused. The slag, which is generally free from gold, is run off. Another charge of ores may then be introduced and treated in the same way without running off the melted metals. Half quantities of the lead and other matters may be used.

In this manner four or more charges may be introduced; the gold being taken up by the lead is afterwards removed by cupellation, or in any other suitable manner.

[Printed, 4d.]

A.D. 1855, February 22.—N° 391.

HARRISON, Thomas.—"A composition for covering and " protecting the bottoms of ships and vessels."—Thirty-five parts of Trinidad or other pitch or rosin are melted, and mixed with 35 parts of chalk (free from sand), " 25 parts of carbonate of barytes, " and 5 parts of sulphate of copper." When the mixture is cooled it is mixed with crude naphtha or spirits of turpentine, and applied to copper or other sheathing.

[Printed, 3d.]

A.D. 1855, March 5.—N° 484.

JOHNSON, William.—" Improvements in coating iron and " *steel* wire with other metals or alloys."—(*A communication from*

A. D. Boucher and Adrien Muller.) Iron or steel wires of all thicknesses are coated with tin, zinc, or metallic alloys by winding them on suitable reels, and passing one or more wires through a vessel containing a solution of "double chloride of zinc and "ammonia," or a simple solution of "hydrochloric acid diluted "with water." The wires are passed through cushions, and the acid that drops is caught in a suitable vessel. From the cushions the wires pass into a bath of molten metal, such as tin, zinc, or alloys. On emerging they pass through steel gauges, and are instantly cooled with jets of water, which imparts smoothness, brilliancy, and whiteness to tinned wires.

[Printed, 10*d.*]

A.D. 1855, March 6.—N° 495.

JENKINS, William.—"An improved method of casting copper "cylinders, copper vessels, and other copper forms." A mould of iron, sand, or loam is made in three principal parts, the bottom, the outside jacket, and the core. Exhaust apparatus is to be used to remove the air, and to facilitate the flow of metal into the mould.

[Printed, 3*d.*]

A.D. 1855, March 12.—N° 550.

HULLS, James, and LOWE, John.—"Improvements in coat-"ing iron and other metals with lead." Metallic surfaces are first cleansed with acid and water, then scoured with sand and water; then immersed for a few minutes in a bath of 1 part ammonia and 16 parts water; then immersed for about an hour in a bath composed of 1 part zinc dissolved in 7 parts of hydrochloric acid; then dipped in a bath of 1 part sal ammoniac and 20 parts of water. The surfaces are then fit to be coated with lead, which is done by immersing them in molten lead kept at a temperature a little below that of red heat.

Surfaces of iron, steel, and copper, and its alloys, may be thus coated for the latter metals and alloys. A bath of bichloride of tin may be used instead of zinc.

[Printed, 4*d.*]

A.D. 1855, March 13.—N° 560.

SWINGLER, Samuel.—"Improvements in the manufacture of "certain kinds of metallic spoons, forks, and ladles." These relate to articles which are "made of iron, and are coated with tin "or other easily fusible metal or alloy." The processes of "rolling "and pickling" are combined. The blanks are rolled "longi- "tudinally and transversely," and are between the rolling processes treated with dilute sulphuric hydrochloric or other acid. This gives a smooth surface to the iron, and a superior finish to the article when coated.

[Printed, 5*d.*]

A.D. 1855, March 13.—N° 563.

ILIFFE, Charles.—"Improvements in the manufacture of "metallic rods, bars, and tubes."—*Provisional Protection only.* Cylinders or billets are made of wrought iron, and are filled with cast iron and rolled out together.

For tubes of other metals that may be drawn or rolled cold, the billet is charged with lead or other soft metal, or fatty or liquid substances.

[Printed, 3*d.*]

A.D. 1855, March 17.—N° 598.

PETITJEAN, Tony, and PÊTRE, Louis.—"Certain improve- "ments in the manufacture of Daguerreotype plates, and of "electro-plated sheets of metal," &c.—(*A communication.*)—*Provisional Protection only.* Upon a surface of polished glass or other smooth polished substance a coating of metallic is deposited; it is then to be placed in a silver bath, in connection with a galvanic battery, and a coat of silver is deposited upon it. Upon the silver a thicker coat of copper or iron, or both, may be afterwards deposited. The combination of metals is said to be advantageous in the Daguerreotype process.

[Printed, 3*d.*]

A.D. 1855, March 26.—N° 657.

DECHANET, Jean Baptiste, and SISCO, Antoine Dominique.—"Improvements in the process of manufacturing metallic

" tubes," &c.—*Provisional Protection only.* Sheets of metal are rolled tightly round a mandril so as to form a tube, the sheets are soldered together by copper, brass, or other metal or alloy. The tubes so made may be substituted for rods of solid metal.

[Printed, 6*d.*]

A.D. 1855, March 29.—N° 703.

JOHNSON, Robert, JOHNSON, William Whittle, and JOHNSON, Robert, the younger.—"A new and improved " covering for surfaces, linings, roofs," &c.—*Provisional Protection only.* Lead, tin, or other malleable metals or alloys are formd into thin sheets. Canvas, or leather, or other flexible material is spread upon the sheets and firmly attached thereto by means of "Jeffery's marine glue," or other glue, or other suitable cement.

[Printed, 3*d.*]

A.D. 1855, March 30.—N° 709.

TYTHERLEIGH, William.—"The application of a certain " well-known process to the covering of iron in sheets or bars " with copper or copper alloys," &c. The process employed for brazing the seams or joints of metals is employed for coating extended surfaces of metals. The surfaces are pickled or otherwise cleansed, and pure copper or the requisite alloy is placed in a finely granulated state on the surface, with borax, or other suitable flux. The copper is then fused and allowed to flow over and coat the surface of the metal.

[Printed, 3*d.*]

A.D. 1855, April 19,—N° 868.

NEWTON, Alfred Vincent.—"Improved machinery for " crushing and grinding mineral and other substances."—(*A communication.*) Minerals are crushed or pulverized in a rotating pan, shell, or vessel placed on a vertical or nearly vertical shaft, and having a rim against whose curved surface the minerals are pressed by centrifugal force, at the same time they are ground by wheels "rotating on an axis radiating, or nearly so, from the " axis of the shell," as shown in the drawings.

[Printed, 7*d.*]

A.D. 1855, April 21.—N° 899.

EDWARDS, William Alexander.—"Separating certain "metals from metallic substances."—*Provisional Protection only.* Iron or steel filings may be separated from brass, gun metal, or other metals or alloys by means of a bar or coil of soft iron, which is converted when required into a magnet by the agency of electricity. When the iron mixed with brass or other metal filings are brought into contact with the magnet, in any suitable manner, the iron adheres thereto.

[Printed, 3*d.*]

A.D. 1855, April, 23.—N° 906.

JENKIN, Alfred.—"Improvements in furnaces for the reduc-"tion and calcination of lead and copper ores." The specification and drawings describe double reverberatory furnaces, so arranged that one fire serves the double purpose of calcining and reducing the ore.

The heat and flames pass first into reducing furnace, and thence are conducted into the calcining furnace. Suitable flues and dampers are described.

[Printed, 8*d.*]

A.D. 1855, April 23.—N° 907.

NEWTON Alfred Vincent.—"Improved machinery for sepa-"rating substances of different specific gravity."—(*A communication.*) Apparatus for washing ores by hand is described with the aid of drawings. The box or vessel in which the ores are washed has the usual sieve, and apertures are made on one or more sides, above the sieve, or the upper sides are made low so that the waste is washed over the sides or edges.

Partitions are made in the box so that the matters washed over are separated from the heavier metallic substances which pass through the sieve.

[Printed, 9*d.*]

A.D. 1855, April 25.—N° 932.

WILKIN, John Bryant.—"Improvements in stamping and "*dressing* or separatirg ores of any kind, but more especially tin

"ores."—*Provisional Protection only.* It is proposed to attach stampers to the axle of a water wheel or other axle.

A stream of water is supplied to the ores, when crushed, and conducts them to a tank where they are washed.

[Printed, 3*d.*]

A.D. 1855, April 25.—N° 935.

ANGER, FRANCOIS JOSEPH.—"A new metallic alloy."—(*A communication.*) An alloy resembling gold is produced by melting in a crucible "100 parts of good copper, 6 parts of magnesite or "substance of a like nature, though perhaps differing in name, "3·60 parts of ammonia or salt of ammonia, 1·80 parts of quick- "lime or other calx, and 9 parts of crude tartar." If the metal is required to be more tenacious, tin is substituted for zinc."

[Printed, 3*d.*]

A.D. 1855, May 4.—N° 1000.

DALTON, DANIEL.—"Improvements in furnaces for the smelt- "ing iron ore and iron stone and other stones and ores." The chamber of the furnace is built "with a feed mouth at the top," at the lower part it is formed hollow to receive the metal as it descends. The furnace has at one or more sides, a fire-place, the heat and products from which pass into the chamber in which the ores are placed.

[Printed, 8*d.*]

A.D. 1855, May 11.—N° 1062.

JOHNSON, JOHN HENRY.—"Improvements in the manufacture "of sulphuric acid;" also in extracting sulphur from copper, iron, lead, and tin ores, &c.—(*A communication from Jean Francois Person, of Paris.*) The specification and drawings describe apparatus for collecting and condensing the fumes of sulphur. The sulphurous acid is directed through nitric acid, heated to about 100°, and previously diluted with about 6 times its volume of water, or through a mixture of nitric and muriatic acid. Nitrous vapour or chloro-nitrous acid is oxydised, and transformed into nitric acid by means of atmospheric oxygen.

[Printed, 8*d.*]

A.D. 1855, May 12.—N° 1067.

WARNER, ARTHUR.—"Improvements in combining sheets of "copper, or its alloys, with lead, tin, zinc, nickle, gold, silver, "platinum, or alloys containing these metals, &c."—*Provisional Protection only.* One surface of a sheet of copper is coated with a suitable solder, and another sheet of metal or alloy is laid thereon, so as exactly to correspond therewith. The solder is then melted, and the sheets are to be united together by pressure.

[Printed, 3*d.*]

A.D. 1855, May 14.—N° 1093.

HILL, LEVI LEWIS.—"Improvements in silvering glass."—A frame or pan of india rubber is used for enclosing the glass surface. The silvering solution is formed by dissolving 1 oz. of pure nitrate of silver in 2 fluid oz. of water, and mixing therewith liquid ammonia until the precipitate which is at first sent down is re-dissolved. 20 or 30 grains of nitrate of silver are then added in sufficient quantity "to produce a slight tarry odour."

To this solution are added 62 oz. of water, in which are dissolved "5 grains of mannite, 1 drachm of sulphuric ether, and 1 oz. "of acidulated sugar." The sugar is prepared by treating 5lbs. of of sugar dissolved in 8 lbs. of water, with $\frac{1}{11}$ in bulk of pure sulphuric acid.

[Printed, 4*d.*]

A.D. 1855, May 18.—N° 1123.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—"An im-"provement in coating wrought iron." Wrought iron surfaces intended for japanner's work, are coated with tin by immersing them in suitable solutions with or without the aid of a battery. Instead of afterwards dipping them in a bath of molten tin, or its aLoy, or zinc, they are coated with varnish or resinous, or greasy, or bituminous substances, preferring such as will aid in the soldering process,

[Printed, 4*d.*]

A.D. 1855, May 21.—N° 1132.

STOCKER, SAMUEL.—"Improvements in machinery and appa-"*ratus for* shaping of metals," &c. Presses, and stamping

screwing apparatus are described, with drawings, for making "union joints and similar articles of brass or other metals or "allows, instead of casting them."

[Printed, 7*d.*]

A.D. 1855, May 22.—N° 1154.

HOLLAND, HOMER.—"Improvements in the method of treat- "ing metalliferous sulphurets." Nitrate of soda is used as a "reagent in the dry process of resolving and assaying various "metalliferous sulphides." Unlike nitrate of potash "it burns "slowly and mildly." 291 parts of the nitrate of soda may be used with "every 100 parts of sulphur found in the ores to be "acted upon." Auriferous and argentiferous ores of lead or galena are by the process transformed "into unsoluble or soluble "sulphates." Modes of producing sulphate of copper and manufacturing sulphuric acid are described.

[Printed, 4*d.*]

A.D. 1855, May 31.—N° 1238.

WHARTON, EMANUEL.—"Improvements in the machinery for "manufacturing metal tubes."—*Provisional Protection only.* The improvements relate to "a machine for rolling various sized "tubes of copper, brass, or other alloys, with one set of rolls." 4 rolls of equal diameters are to be used, their peripheries are of such a form that when put together they form an octagonal aperture, through which the tube is passed. Three of the rolls are adjustable, so that the aperture can be enlarged. The tubes are finished in a circular form, by drawing them or passing them through grooved rollers of the usual form.

[Printed, 3*d.*]

A.D. 1855, June 4.—N° 1273.

MOREWOOD, EDMUND, and ROGERS, GEORGE.—"Im- "provements in coating sheets of wrought iron." Surfaces of wrought iron are cleansed in the usual way, then coated by copper, lead, zinc, bismuth, cadmium, or antimony, and deposited upon them from solutions of those metals. They are then covered with a protecting coating of "turpentine, resins, lac, "gums, oils, grease, gelatinous or bituminous matters." These

will cover and protect the sheets, and admit of their being afterwards soldered. The sheets are less costly than ordinary tin or zinc plates, and "retain their original even surfaces and "ductility."

[Printed, 4*d*.]

A.D. 1855, June 5.—N° 1276.

PULS, Francis. — "Improvements in electro-coating iron." The surfaces of the iron are cleansed in acid solutions, but are left rough, and not scoured. They are then immersed in a solution of sulphate or hydrochlorate of zinc in connection with a battery. The electric current is "so regulated that the resistance against "the electric current in the bath, in which the articles are "placed, may be rendered equal, or nearly so, to that in the "battery." To obtain this effect "the surfaces of the effective "or active sides of the positive plates of the battery should be "equal, or rather greater than the surface of the articles to be "coated." Otherwise the deposit will be "slow and uncertain," and the articles will be rough.

[Printed, 3*d*.]

A.D. 1855, June 18.—N° 1384.

BESSEMER, Henry.—"Improvements in the manufacture of "cast steel, and mixtures of steel and cast iron." Machinery for cutting iron into small pieces, and retorts for melting it and converting it into steel, are described with drawings.

Mixtures of steel and cast iron are made by heating the pieces of steel in a melting pot, and melting cast iron, and allowing it when melted to flow down, and fill up the interstices of the steel; or molten cast iron is poured on the steel when it is highly heated.

A melting furnace is described wherein fixed pots are used which are tapped from below, and the charges of several pots are conducted by onverging troughs into a common receptacle to form one casting.

[Printed, 1*s*. 9*d*.]

A.D. 1855, June 18.—N° 1388.

BESSEMER, Henry.—"Improvements in the manufacture of "*rolls* or cylinders used in the lamination, shaping, and cutting

"of metals, in crushing ores," &c. The rolls or cylinders are cast in molten steel, or a mixture of steel and pig or refined iron. Those which are required to be solid are cast with their axes entire, those which are hollow are prepared so as to receive a wrought iron axis. The moulds used are made of dried loam, heated to a low red heat.

[Printed, 4*d.*]

A.D. 1855, June 19.—N° 1403.

JOHNSON, JOHN HENRY.—"Improvements in the manufac-"ture of dish covers, dishes, plates, and other articles of sheet "metal," &c.—(*A communication.*)—*Provisional Protection only.* The articles are to be formed of sheet iron, to which suitable shapes are given by stamping apparatus. The iron surfaces are first coated with copper, german silver, or other suitable metal or alloy. They are then plated or gilt in the manner ordinarily employed for plating or gilding articles made entirely of German silver or copper.

[Printed, 3*d.*]

A.D. 1855, June 22.—N° 1437.

BELLFORD, AUGUSTE EDOUARD LORADOUX.—"Improve-"ments in pulverizing quartz, mineral, and other hard sub-"stances."—(*A communication.*) The ores are crushed in a rotating pan or vessel, which is placed on a vertical, or nearly vertical shaft, having a rim curved inwards. A wheel or wheels are made to rotate on radial arms connected with the vertical shaft, and have "a rounded or beveled tread" corresponding to the shape of the vessel. The wheels act in such a manner that as the vessel rotates "the plane of motion of the said wheel or "wheels shall be tangent to a circle of less diameter than, and "form an angle with, the plane of motion of the vessel." The wheels have "a grinding or slipping motion," and crush the ores against the inner periphery of the pan, where they are held by centrifugal action.

[Printed, 7*d.*]

A.D. 1855, June 25.—N° 1449.

HARRIS, JOSIAH.—"A machine and apparatus for crushing "pulveriseing metals, metallic ores," &c., "and for obtaining,

"washing, dividing, amalgamating metals," &c.—*Provisional Protection only.* A vessel about 15 feet long and 4 feet broad is proposed to be used for washing ores, "at the top is a chamber "wherein is a ball." Crushing apparatus and an amalgamating machine are to be connected with the washing apparatus.

[Printed, 3*d.*]

A.D. 1855, June 25.—N° 1453.

PARSONS, PERCEVAL MOSES.—"Certain improvements in "moulds for casting metals."—*Provisional Protection only.* The moulds are made of clay of a refractory nature mixed with siliceous substances, and black lead charcoal or sawdust. The compound is baked or burned until it is so hard that it will bear molten metal being poured therein, and "that a number of castings may "be made from the same mould."

[Printed, 3*d.*]

A.D. 1855, June 28.—N° 1478.

BESLEY, ROBERT.—"An improved manufacture of metallic "alloy, applicable to the casting of type and other articles."—(*A communication.*) A hard and tough alloy suitable for type founding, and which retains its fluidity long enough to insure a good casting, and then sets quickly, is obtained by combining

100	parts of	virgin lead,
30	„	regulus of antimony,
20	„	tin,
8	„	nickel,
5	„	metallic cobalt,
8	„	copper,
2	„	bismuth.

The nickel and cobalt are first melted with the copper and bismuth, the mixture is then added to the alloy of the other metals and antimony.

[Printed, 3*d.*]

A.D. 1855, July 10.—N° 1543.

ELKINGTON, CHARLES JAMES CHEATLEY.—"Improvements "in depositing metals and their alloys."—*Provisional Protection only.* In depositing metals and their alloys, it is proposed to

employ "a bath, of a solution of the metal in the particular alloy, "which is most difficult of deposition," "and to supply to this "bath the metal or metals which are more easy of deposition "only as they are required." This is done by placing in the bath a pole consisting of an alloy of the metals which are required to be deposited. Metals which are easy of deposition are supplied to the bath by any convenient means.

[Printed, 3*d.*]

A.D. 1855, July 24.—N° 1681.

PETITJEAN, Tony.—"Improvements in silvering, gilding, and "platinizing glass." These consist in coating glass with solu- "tions or products obtained "by combining vegetable acids or "hydracids (or these combined with chlorine, iodine, or bromine) "with metallic salts of silver, gold, or platinum, the bases of "which are combined with mineral acids or hydracids." An alkali must be combined with the metallic salt, or with the vegetable acid. Specific proportions are given for preparing the various solutions.

[Printed, 4*d.*]

A.D. 1855, July 30.—N° 1730.

TRURAN, William.—"Improvements in smelting and in "apparatus to be used therein." These relate first to the blast used in smelting metals. The blast nozzles used have a divided bore, so that jets of varying intensity may be injected from the same nozzle. A particular form of chamber is described as being specially suited for blast furnaces for smelting iron.

[Printed, 7*d.*]

A.D. 1855, July 31.—N° 1734.

MACKWORTH, Herbert.—"Improvements in washing and "separating minerals and other substances in a granular or "pulverulent state." Apparatus and processes for washing and sorting crushed mineral substances are described with drawings. Currents of air or water are passed up through the substances, and oscillating perforated plates or sieves are used in various combinations to separate the particles according to their sizes and specific gravities. Six different processes are described.

[Printed, 1*s.* 2*d.*]

A.D. 1855, August 4.—N° 1770.

WARNER, Arthur.—" Improvements in coating or combining " sheet iron and steel with sheet lead, zinc, tin, copper, or alloys " of such metals." Sheet iron or steel is combined with sheet lead, tin, zinc, copper, or their alloys by applying soldering metal between them, so as to cover the surface of one sheet; the sheets are then united by heat, and pressure applied in any suitable manner.

[Printed, 3d.]

A.D. 1855, August 11.—N° 1823.

HEWITT, Thomas.—" Improvements in machinery for pul- " verizing and levigating by means of pestle and mortar." Crushing ores. The handle of the pestle "is supported in a swivel " bearing," its upper end fits in a slot, in a pulley, or is "con- " nected to a sliding bush fitting in the pulley," to which rotatory motion is given. An eccentric motion may be given to the pestle by means of "a cam acting on the sliding bush in the pulley."

[Printed, 8d.]

A.D. 1855, August 27.—N° 1944.

NEWTON, Alfred Vincent.—" Improvements in separating " substances of different specific gravities."—(*A communication.*) The specification and drawings describe crushing apparatus, consisting of one or more wheels turning about a central vertical shaft in a vessel containing water.

A mercury amalgamator is connected therewith, apparatus called "a grain separator" is used for sifting grains of gold from crushed ores.

[Printed, 8d.]

A.D. 1855, September 3.—N° 1985.

CHANCE, James Timmins, and ADCOCK, Henry.—" Im- " provements in casting articles of the slags produced by the " smelting of iron and other ores." The fluid slag obtained in *smelting* ores is run into heated vessels which have a hole in their

bottoms which may be unstopped when required and the slag be run therefrom. The moulds used are made of moulder's sand, and are gradually dried, and when used are heated to a red heat.

[Printed, 1s. 4d.]

A.D. 1855, September 4.—N° 1997.

TAYLOR, JOHN GEORGE.—" Improvements in coating, covering, " or plating metallic surfaces."—*Provisional Protection only*. The proposed improvements consist in applying aluminium as a coating for metallic surfaces, and a protecting coating for sheathing ships and other purposes. The electro process or the old system of plating with sheets may be employed.

[Printed, 3d.]

A.D. 1855, September 5.—N° 2013.

MARTIEN, JOSEPH GILBERT.—" Improvements in roasting, " calcining, oxydizing and subliming metallic and mineral sub- " stances, and in the apparatus and means to effect the same." Kilns and apparatus for roasting and calcining copper, zinc, tin, lead, and other ores are described with the aid of drawings. Currents of air or steam are injected into, and among the substances while they are being calcined or roasted, by means of perforated pipes which are introduced into the kilns, or by other means that may be convenient.

[Printed, 10d.]

A.D. 1855, September 15.—N° 2085.

HILL, DAVID.—" Preparing a material capable of resisting fire, " and especially suitable for the interior of puddling and other " furnaces." Limestone is combined and melted with ironstone, or with the cinder from puddling or ball furnaces, the fused mixture is run into moulds of the requisite shape, and may be used as a fire-resisting material for furnaces.

[Printed, 3d.]

A.D. 1855, September 15.—N° 2088.

ZENNER, DAVID.—" Improvements in washing and separating " pulverized ores and matters."—(*A communication*.) A circular

or polygonal washing table, having a surface inclined from the centre outwards and rotating round a vertical shaft, is used. The table may be of sheet iron, or lead, or gutta percha, or other material, and be plain or corrugated, or covered with cloth or other material.

The pulverized ores are mixed with water, and while in suspension are directed upon the rotating table, and by means of brushes, some moving and some fixed, or by other similar appliances, and by the centrifugal motion imparted by the rotating table, the metallic or other particles are separated and sorted according to their specific gravities.

[Printed, *7d.*]

A.D. 1855, September 17.—N° 2097.

TURNER, Noah.—" Certain improvements in the manufacture " known as 'gold wire' and 'gold plate,' for the production of " gold thread or gold lace.—*Provisional Protection only.* Instead of covering plate or wire intended to be guilt with a thin coating of silver, the plate or wire is to be first coated with aluminium. This will economise cost.

[Printed, *5d.*]

A.D. 1855, October 1.—N° 2183.

MITCHELL, John.—" Improvements in apparatus for washing " and amalgamating ores and other matters."—*Provisional Protection only.* Pulverized ores and matters to be amalgamated are placed with water in troughs, in which suitable screws are made to work and agitate the substances. Two troughs with screws may be used, and the substances may be passed from one to the other.

[Printed, *3d.*]

A.D. 1855, October 3.—N° 2210.

NEWTON, William Edward.—" Improved machinery for separating gold and other metals from their ores."—(*A communication.*)—*Provisional Protection only.* The auriferous or other ores are to be washed and crushed in a metal basin, which is supported at its centre by a ball and socket joint. Balls are to be used for crushing the substances, the basin receiving a suitable

depressed and rotating motion. The wash from the crusher basin is conveyed by a hollow shaft to an amalgamating mill, and the auriferous particles are combined with quicksilver by suitable apparatus.

[Printed, 3*d.*]

A.D. 1855, October 12.—N° 2280.

PULS, Francis.—" Improvements in electro-coating metals or " alloys of metals with other metals or alloys of metals."—*Provisional Protection only.* Metals and alloys are to be deposited by galvanic agency; the positive plates of the batteries are made to consist of the metals or alloys to be deposited as coating.

The ordinary acid solutions may be employed.

[Printed, 3*d.*]

A.D. 1855, October 13.—N° 2297.

LOZANO, Manuel Perez.—" Improvements in treating pyrites " and ores containing sulphur in obtaining sulphuretted hydro- " gen, and in precipitating copper from solutions."—(*A communication.*) The specification and drawings describe a closed furnace provided with suitable pipes, and collecting and condensing apparatus for operating upon pyrites, and other sulphurous ores, and obtaining sulphur.

Hydrogen or carburetted hydrogen gas, which is produced in a suitable gas generator, is applied to the sulphur when in the form of vapour and sulphuretted hydrogen is thus produced, or it may be produced by retort apparatus as described. The sulphuretted hydrogen is injected into a solution of sulphate of copper, made by lixiviating calcined ores in the usual way, a precipitate rich in copper is sent down, which is washed, dried, and smelted into rich regulus, and is worked up into fine copper by the ordinary processes.

[Printed, 11*d.*]

A.D. 1855, October 16.—N° 2312.

FORREST, John.—" An improved mode of extracting metals " from their ores." The ores of precious metals are broken small, and immersed for a short time in a hot alkaline bath formed of American potash or common soda. When saturated with the

alkaline solution the ores are exposed to a white heat in a suitable retort or furnace. The alkali will form a flux, and aid in fusing the ores and separating the metallic particles, or the ores may be mixed in the furnace with a dry flux, in the following proportions: with half a ton of ore, mix nitrate of potash 1 lb., carbonate or borate of soda 1 lb., and common soda 8 lbs.

[Printed, 3*d*.]

A.D. 1855, October 18.—N° 2340.

STIRLING, JOHN DAVIE MORRIES.—"Improvements in coat- " ing silver, copper, zinc, and iron, and alloys of those metals." These consist in coating silver, copper, zinc, or iron, or their alloys, with aluminium by the ordinary " simple rolling process, and " using heat when necessary."

[Printed, 3*d*.]

A.D. 1855, October 24.—N° 2378.

HEALEY, JOHN, FOSTER, JOHN, and LOWE, JOHN.—"Im- " provements in machinery to be used for drawing, moulding," rolling metals, &c. Bell-mouthed tubes are used in connection with rolls. Adjustable apparatus is used for making the rolls approach or recede from each other.

Forging apparatus is described in which the hammer is lifted by means of pulleys or rollers, having parts of their peripheries cut away."

[Printed, 11*d*.]

A.D. 1855, October 26.—N° 2394.

CALVERT, FREDERICK CRACE.—" Improvements in the treat- " ment of copper slags, scoriæ, or cinders, so as to obtain the iron " which they contain."—*Provisional Protection only*. Copper slags, scoriæ, or cinders are to be mixed with from half to one-third of their weight of slacked lime or carbonate of lime The mixture may be calcined and melted in a blast or other suitable furnace, with coke or coal, and the iron they contain may be thus extracted."

[Printed, 3*d*.]

A.D. 1855.—November 14.—N° 2562.

SKINNER, THOMAS.—" Improvements in producing figures or " ornaments upon the surfaces of metals." Ornamental figures are produced on surfaces of soft metal by pressing them against suitable dies or moulds, and then subjecting the reverse surfaces to the action of suitable tools, which press the surface against the die or mould, and impress in or raise upon it the required figures. The tools used may be burnishers or " spinning tools," such as are used in operating upon Britannia metal.

[Printed, 4*d.*]

A.D. 1855, November 26.—N° 2657.

WILKES, JOHN.—" An improvement or improvements in the " manufacture of tubes of copper and alloys of copper." Short cylinders of copper or alloys are elongated into tubes by passing them through grooved rollers, the grooves forming an aperture not quite circular, but somewhat flattened. After the tubes have been once passed through, they are turned round, so as to make a quarter of a revolution on their axes, and are again passed through. Rolls having apertures of decreasing sizes are used, and the tubes are passed through them in succession.

[Printed, 5*d.*]

A.D. 1855, November 27.—N° 2676.

JOHNSON, JOHN HENRY.—" Improvements in sheathing " ships."—(*A commuication from Messrs. Jackson, Gaudet, and Co., Rive de Gier, France.*) Instead of using copper, zinc, or their alloys for sheathing, plates of steel are employed.

[Printed, 3*d.*]

A.D. 1855, November 28.—N° 2685.

ROSENBERG, BENJAMIN.—" Improvements in protecting " metallic and other surfaces from corrosion and decay."—(*A communication.*) A protecting composition for coating iron or other metallic surfaces (especially pots used in making sugar) is formed by mixing 100 lbs. of triturated white lead, 2½ gallons of copal varnish, 1⅛ gallons of spirits of turpentine and 1⅛ gallons of linseed oil.

[Printed, 3*d.*]

A.D. 1855, November 30.—N° 2704.

HANCOCK, RICHARD.—" Cleaning and seperating ores of every " description when brought into a state of low pulverization." Pulverized ores are mixed with water and washed and separated by washing and sifting apparatus described with drawings. The ores are charged upon inclined tables, and water is directed upon them, and agitated with suitable brushes; when washed, they are removed into suitable vessels by the action of the water directed upon the inclined tables, and there separated in the usual way.

[Printed, 9*d.*]

A.D. 1855, December 3.—N° 2721.

WATT, ALEXANDER.—"An improvement in coating iron and steel " with zinc." A solution of zinc is formed by dissolving 200 oz. of cyanide of potassium in 20 gallons of water, and adding thereto 80 oz. of strong liquid ammonia (sp. gr. 880°). Several porous cells are then placed in the solution, and into each of them is poured so much of a strong solution of cyanide of potassium (say 16 oz. to the gallon) that the level of the liquid in the cells may equal that of the liquid outside. Pieces of copper or iron are attached by copper wires to the negative pole of a battery, and immersed in the solution contained in the porous cells. Pieces of zinc, by preference, " milled zinc " which may be previously pickled, are connected with the positive pole and immersed in the the ammonia solution. The battery is "set in action" and continued until "the solution of cyanide of potassium and " ammonia has taken up about 60 oz. of zinc, that is to say, " about 3 oz. to the gallon of the solution." About 80 oz. of a carbonated alkali, by preference, carbonate of potassa, are then dissolved in a portion of the solution, and added to the original solution, which is stirred, allowed to settle, and then drawn off ready for being used as a zinc bath for coating metals, as wrought iron and steel.

These are cleansed by dipping them in a pickle composed of—

Sulphuric acid, 1 lb.,
Hydrochloric acid, ½ lb.,
Water, 2 gallons,

and then are immersed in the zinc solution and connected with a battery, and are coated in the usual way.

[Printed, 4*d.*]

A.D. 1855, December 6.—N° 2756.

THOMAS, FREDERICK SAMSON, and TILLEY, WILLIAMS EVANS.—"Improvements in producing aluminium and its alloys, "and in plating or coating metals with aluminium and alloys, "composed of aluminium with other metals." Aluminium is produced by causing it to be deposited by galvanic action from suitably prepared solutions of alumina, it may be deposited as required upon and so coat metallic surfaces.

Various solutions of alumina are described. About 4 gallons of solution may be prepared by heating about 4 lbs. of alum in a suitable pot or vessel until it becomes a dry powder. The powder or calcined alum is mixed with about 2 gallons of distilled water and boiled, 2 lbs. of cyanide of potassium are then added and boiled therewith, and afterwards 2 gallons more of water and 2 lbs. of cyanide of potassium are added, when well boiled the solution is filtered and is ready for use; or 4 lbs. of alum may be dissolved in water and salts of tartar or ammonia, or carbonate of potassium be added thereto until the precipitation caused shall cease; the precipitated oxide is filtered and washed and boiled with distilled water (about 4 gallons) and cyanide of potassion (about 4 lbs.) to form a solution or bath. In the bath the articles to be coated are connected by a brass or copper rod to the zinc or negative pole of the battery; to the positive is attached a piece of platinum or a pole of aluminium. An alloy composed of aluminium and silver, or aluminium, copper, and silver may be deposited by using a pole of silver or of alloy of silver and copper.

Tin may be alloyed by using a pole of tin. Other alloys may be deposited by using suitable poles as described.

[Printed, 5*d.*]

A.D. 1855, December 14.—N° 2824.

PHILIPPI, WILLIAM.—"Improvements in coating iron with "tin."—*Provisional Protection only.* It is proposed to employ "a solution of chloride of zinc in lieu of grease, as commonly "employed in the process of tinning iron" as a protecting stratum. The surface then "retains a high polish."

[Printed, 3*d.*]

1856.

A.D. 1856, January 1.—N° 3.

CALVERT, John.—"Improvements in extracting metals from "their ores."—*Provisional Protection only.* It is proposed to pass electric currents through ores of metals while they are being melted in the furnace; or the ores are immersed in water which is to be charged with "an opposite substance to the base of "the ore," that is "if the ore be quartz or acid base," the water is charged with alkali, the water being kept under electric in fluence. Substances of opposite natures are made to act upon each other, "as oxide of tin on sulphuret of copper or sulphuret "of iron on carbonate of iron." The known acidulous solutions being used in connection with electric agency.

[Printed, 3*d.*]

A.D. 1856, January 9.—N° 76.

ADCOCK, Henry.—"An improvement in casting iron and other "metal."—*Provisional Protection only.* The metal is cast in highly heated moulds which may be made of sand. The moulds are to be placed in an oven or muffle, and raised from the bottom so that heat may have access to them on all sides. The heat is applied gradually and increased from time to time.

[Printed, 3*d.*]

A.D. 1856, January 10.—N° 78.

DARLINGTON, John.—"Improvements in the manufacture or "production of zinc or spelter."—*Provisional Protection only.* Oxide of zinc "as it may be produced from the ores of zinc" is to be passed through the fire either enclosed in a furnace or in a tube of clay heated outwardly by the fire. Vapours of metallic zinc are produced which are condensed by suitable apparatus.

[Printed, 3*d.*]

A.D. 1856, January 12.—N° 91.

OUDRY, Charles François Leopold.—"Certain improve-"*ments* in the preservation of metals and other solid sub-

" stances." A coating of composition, made of metallic powder or salts and bituminous or resinous substances, is applied to the surfaces of iron, zinc, or other metals or alloys, or of wood, paper, or stone. The metallic powders, such as copper or graphite make the composition a conductor of electricity.

Upon the substances so covered, a coating of copper is deposited by the ordinary electro process or by simple immersion.

[Printed, 3*d.*]

A.D. 1856, January 29.—N° 234.

DARLINGTON, George.—" Producing oxide of zinc from its " ores."—*Provisional Protection only.* Zinc ores, either blende or calamine, are to be mixed with lime, limestone, or tap cinder, or natural or artificial silicates of iron, or oxide of iron, or carbonaceous matter, and are heated in a suitable furnace, so as to produce oxide of zinc.

The oxide of zinc is passed into suitable apparatus, and converted into metallic zinc in the usual way.

[Printed, 3*d.*]

A.D. 1856, January 29.—N° 245.

POPE, Abraham.—" Improvements in the manufacture of iron, " copper, tin, and lead." In manufacturing iron, the iron ores are melted in a blast furnace, with a mixture of $\frac{2}{3}$ anthracite coal or charcoal, and $\frac{1}{3}$ carburretted siliciate of alumina (the residuum from the distillation of boghead or torbane coal or other bituminous schist). 250 lbs. of the mixed fuel may be used with a ton of ore. More highly carburetted iron is produced by using more of the mixed fuel.

In manufacturing copper, the copper ores are roasted in the usual way, and are continued in a melted state for about 3 hours; at the end of the 2nd hour to each ton of ore are added 70 lbs. of iron scale or oxide of iron or slag; at the end of the 3rd hour 200 lbs. of oxide of iron or hematite ore, and 4 cwt. of the anhydrous siliciate of alumina. The proportions vary according to the quality of the ore; if they contain about 20 or 25 per cent. of copper, those given will answer. The anhydrous siliciate of alumina may also be used in the process of refining copper. Ores

of tin and lead are also mixed with the anhydrous siliciate or boghead refuse, in proportion varying from $\frac{2}{3}$ to equal proportions.

[Printed, 4*d.*]

A.D. 1856, February 13.—N° 369.

NEWTON, William Edward.—" Improvements in the manu-" facture of zinc."—(*A communication.*) Furnaces are described with the aid of drawings, having suitable collecting flues and condensing apparatus for making metallic zinc directly from the ores, and from what is technically called "blue powder" or " grey powder," which are reduced in closed retorts.

The metallic vapours of zinc, when driven off from the ores by heat, are passed through a charge of heated or incandescent coal or other carbonaceous matter in a closed oven.

Muffles or retorts are used, in which the charge of ore and carbonaceous matter is heated without access of atmospheric air.

[Printed, 9*d.*]

A.D. 1856, February 14.—N° 377.

MEYER, John Conrad.—" Improvements in machinery for " rolling metal."—*Provisional Protection only.* Two rollers are mounted in the same plane, and an adjustable roller works above them. The surfaces of the rollers have in them suitable recesses or grooves, and heated metal is to be rolled into the required shapes by being passed through them.

[Printed, 3*d.*]

A.D. 1856, February 14.—N° 385.

MOREWOOD, Edmund, and ROGERS, George.—" Im-" provements in drying and coating iron and copper." Sheets of iron or copper after being cleansed in suitable baths (preparatory to being coated with metals) are dried by passing them through rollers which may be heated by steam or otherwise.

When the sheets are coated with varnish or water repellant substances (as described in the specifications of former Letters Patent, see *ante*, pages 290, 291), they are passed between rollers, to equalize the surfaces thereof.

In coating metallic articles with metals, by the electro process, they are supported in the solution on bars, racks, or wires, or supports, made of the same metal or metals, which may be required to be deposited on the surfaces of the articles.

[Printed, 4d.]

A.D. 1856, February 14.—N° 386.

HEWITSON, William Watson. — "An improvement in "casting the bearings or brasses of machinery." Alloys of copper, tin, and zinc, when cast into the form of bearings for machinery in the common sand moulds are apt to shrink, and a separation of the various metals is found to take place. To prevent this, and insure a proper mixing of the metals during the cooling, the compound or alloy is cast in metal moulds, these are sometimes thinly coated with loam, and heated to about 200° F.

[Printed, 3d.]

A.D. 1856, February 22.—N° 459.

TOUCAS, Georges.—"A new metallic alloy." A hard malleable alloy, resembling silver, is made by mixing together nickel 4 parts, copper 5 parts, tin, lead, zinc, and antimony each 1 part.

These are melted in a crucible cast and rolled into sheets, and may be used in silversmith's work instead of silver."

[Printed, 3d.]

A.D. 1856, February 28.—N° 515.

GROSRENAUD, Pierre Louis. — "Improvements in appa-"ratus or furnaces for melting and puddling metals." The specification and drawings describe furnaces constructed with the view of enabling fuel to be saved, and heat to be applied directly.

In one class of furnace 7 or more melting pots of an elongated form. The fuel is gradually heated as it is supplied to the grate. Stationary pots of large size having orifices at the bottom may be used.

The pots are made out of old pots and fire clay, and quartz pressed in a powerful hydraulic press.

Reverberatory furnaces are also described.

[Printed, 1s.]

A.D. 1856, March 7.—N° 571.

HÄHNER, CHEVALIER GUILLAUME.—"Certain improvements "in the treatment of ores."—(*A communication.*) These consist "in a mode of decomposing metallic oxides, and especially the "oxide of copper, at a high temperature in the presence of vapours "of water, and of silica, by means of alkaline chlorides, or other "chlorides, forming oxychlorides, or chlorides soluble in water, "avoiding the loss of metal from the formation of free soda, or "soda combined with silica, &c., by the addition of an acid, and "in separating the metals and other substances contained in the "solutions."

[Printed, 3d.]

A.D. 1856, March 7.—N° 573.

HOLMES, FREDERICK HALE.—"Improvements in machines "known under the name of magneto-electric machines." A combination of helices and magnets is described with the aid of drawings, the magnets being so arranged that "their poles occur at "regular intervals around the circumference of the wheels that "carry the helices," which are arranged on any one wheel, so that their centres are in a similar position relative to the poles at every part of their revolution. The electric currents generated are employed among other purposes, as for obtaining light for separating metals from their ores.

[Printed, 10d.]

A.D. 1856, March 12.—N° 595.

STANLEY, JOHN MARTIN, BELLAMY, GEORGE, and BOOTH, WILLIAM.—"Improvements in the manufacture of "rolls for rolling steel, copper, lead, or other malleable material." —*Provisional Protection only.* The axle of the metal is cast first "of tough metal;" when it is cold, a perimeter or shell of a

harder metal and finer texture is to be cast upon the axle, which is to be made somewhat smaller in diameter at the middle than at the extremities, to provide for the shrinkage in cooling.

[Printed, 3*d.*]

A.D. 1856, March 14.—N° 621.

NEWTON, William Edward.—" Improved machinery for " separating gold and other metals from their ores."—(*A communication*). The auriferous ores are crushed in a basin supported on a ball and socket joint, the basin " rocks and gyrates " while a crusher ball crushes the ores.

An arm is used for depressing the basin immediately in front of the crusher ball, in combination with a second or supplemental ball that works in the basin.

An amalgamating mill is used, through the cone of which the wash of the crusher basin is discharged, and ground and agitated in contact with a volume of quicksilver confined by a barrel surrounding mill stones.

[Printed, 9*d.*]

A.D. 1856, March 17.—N° 633.

MITCHELL, John.—" Improvements in apparatus for washing " and amalgamating ores and other matters." Washing and amalgamating machines are described with the aid of drawings. Two troughs are used, placed side, divided by a partition, which allows the water and crushed ores to pass from one to the other. In the troughs revolve screws in opposite directions, the ores are agitated, washed, and amalgamated, and pressed by the action of the screws, first through one trough and then through the other.

[Printed, 6*d.*]

A.D. 1856, March 19.—N° 659.

NEWTON, Alfred Vincent.—"Improved means for separating " substances of different specific gravities."—(*A communication.*) The substances to be separated are fed upon a screen or perforated table. Blasts or currents of air are forced upwards from below, the substances are agitated and caused to settle layers according to their respective specific gravities, and are removed by a series of moving scrapers.

[Printed, 7*d.*]

A.D. 1856, March 25.—N° 711.

BALL, William.—" Improvements in machinery for stamping " ores." Auriferous or other ores are crushed in a mortar by a stamper connected with the piston of a steam cylinder. The stamp head is made to rotate by suitable apparatus, and the rod on which it is fixed is eccentric to the stamper, so that it always strikes upon fresh material, and packing is prevented. Suitable feeding spouts are described with drawings, and grates which are used to prevent particles of ores from being driven out from the mortar.

[Printed, 7*d*.]

A.D. 1856, March 27.—N° 736.

BALL, William.—" Improvements in machines for separating " copper and other metals from their ores." Machines for washing copper and other ores are described with drawings. Two vibrating troughs are used, one above the other, and the ores are delivered with water by feeding apparatus to the first trough, and are afterwards carried into the second trough. Water is permitted " to blow from the trough at two different levels, each of them " above that to which the metallic particles are allowed to settle," whereby a head of water is maintained " entirely above the ore, " which is thus kept loosened and suspended as required."

[Printed, 10*d*.]

A.D. 1856, March 28.—N° 750.

TRUEMAN, Alfred.—" Improvements in treating argentiferous " regulus." The argentiferous regulus or " artificial compound, " containing sulphur, silver, and copper, besides other metals," is pulverized and calcined to drive off sulphur and reduce the metals to oxides.

The calcined regulus is treated with sulphuric or other acid to dissolve copper, and hydrochloric or other acid to " render in- " soluble all the silver as chloride." Heat may be applied. The supernatant liquor is drawn off, and the copper precipitated on iron. The chloride of silver is washed and dried, and mixed with ¼ of its weight of lead or litharge, and fused with suitable fluxes, *as three parts* by weight of carbonate of soda to one part of the

silver contained in the regulus. The usual process of cupellation may be employed for separating the lead from the silver.

Instead of using hydrochloric acid or chloride with the sulphuric or dissolving acid, they may either of them be added to the regulus before or during the process of calcination.

[Printed, 3*d.*]

A.D. 1856, March 31.—N° 776.

CORNFORTH, Henry.—" A new or improved manufacture of " plated tea pots and coffee pots, and other vessels and articles of " like manufacture." The articles are made of zinc or an alloy of pure zinc, and are coated by the electro process, first with copper and then with silver. Sometimes the articles are first with tin, or a fusible alloy of tin and lead, by fusing the metal or alloy on the zinc. By using zinc instead of German silver, brass, or Britannia metal, economy in cost is effected.

[Printed, 3*d.*]

A.D. 1856, April 5.—N° 825.

WEBSTER, James.—" A new or improved elastic metallic tube, " and the method of manufacturing the same." Tubes are " made of brass, copper, or other metal or alloy, in which a series " of corrugations are made in planes, perpendicular to the axis of " the tube." The tube is made to revolve in a lathe, and the corrugations are formed by pressing suitable rollers against the surface of the tube, the grooves or indentations so made are gradually deepened by repeated processes.

The tubes so made have elasticity and flexibility, and may be used for tubes where the metal is exposed to various temperatures of heat.

[Printed, 7*d.*]

A.D. 1856, April 12.—N° 874.

MASH, James.—" Improvements in the fusible plugs and fur- " naces of steam boilers." The ordinary plugs made of fusible alloys, and used for steam boilers, are liable to injury from the action and compression of steam. Parts of the metals are squeezed out and carried away, leaving the metals combined in altered pro-

portions, and fusible at different and often much higher temperatures. By "applying the more fusible metals, or alloys of metals, "of conical, taper, or pyramidal shape for plugs," unequal compression and wear is avoided, and the metals or alloys are retained, combined in their original proportions.

[Printed, 7*d.*]

A.D. 1856, April 14.—N° 883.

SYMONDS, JOHN, and FELL, THOMAS MARA.—"Improve-"ments in the reduction of gold, silver, and other ores." Stamping apparatus is described with the aid of drawings, in which the bed plate is placed at an angle so as to deliver the crushed ores. The stamps are made to move vertically.

Amalgamating apparatus is connected therewith.

A blowing apparatus or separator is described for operating upon the metallic auriferous powders.

Reducing furnaces are described into which "a combined blast "of atmospheric air and steam and carbonaceous substances in "powder is introduced."

[Printed, 1*s.* 7*d.*]

A.D. 1856, April 15.—N° 899.

SOUTHBY, EDMUND RICHARD.—"An improvement in coating "iron with copper." The surface of the iron is cleansed with "acid pickle," then dipped into a weak alkaline solution, then dried and scoured with dry sand. The article is then suspended by iron wires in a solution formed by dissolving about 2lbs. of carbonate of soda in a gallon of water, heated to boiling point for about an hour. It is then removed and immediately placed in the coating bath formed by dissolving 10oz. of cyanide of potassium in a gallon of water, and adding thereto as much freshly precipitated oxide of copper as the solution will take up. The bath is worked "at a temperature of 180° F. with a copper pole, "and with the precautions that are usual when depositing "copper."

[Printed, 3*d.*]

A.D. 1856, April 18.—N° 923.

TYTHERLEIGH, WILLIAM.—"A new or improved method of "coating or covering iron or articles of iron with copper or alloys

"of copper." The iron is well cleansed and then dipped in a bath of melted copper, or alloy of copper, and other metals with borax or other suitable flux. The iron or the bath is agitated, and a coating of copper or alloy is deposited on the iron as it becomes heated; or the copper or alloy may be put on the iron and fused with a suitable flux so as to coat the iron.

[Printed, 3*d*.]

A.D. 1856, April 19.—N° 941.

WILKES, Thomas.—"A new or improved method of manu-"facturing tubes of copper and alloys of copper." Thick hollow cylinders of copper or alloys of copper are elongated and diminished in diameter so as to form tubes by passing them, supported internally by a mandril, through rollers. The rollers have grooves which are "of a semi-circular section, or have a section the curve "of which is a portion of a circle less than a semicircle."

[Printed, 3*d*.]

A.D. 1856, April 22.—N° 964.

LLOYD, David.—"Improvements in washing minerals, coals "and ores." Apparatus for washing ores is described with the aid of drawings. The ores are placed in a suitable vessel having a perforated zinc or other metal bottom. Compressed air is forced from a blowing cylinder beneath the water and perforated bottom, and currents are thus forced up and among the ores.

[Printed, 6*d*.]

A.D. 1856, April 29.—N° 1016.

TITTERTON, Charles.—"An improvement in the manufacture "of white zinc."—*Provisional Protection only*. Refuse products containing zinc as "ashes, dross, and skimmings," are proposed to be mixed with broken coke or carbon, and melted in suitable muffles or retorts so as to produce white zinc from the refuse matters.

[Printed, 3*d*.]

A.D. 1856, April 30.—N° 1022.

SPILSBURY, Francis Gybbon.—"Separating metals, metallic "oxides, and metallic acids from their ores."—*Provisional Pro-*

tection only. Ores of various metals as of gold, tin, tungsten, &c., are to be mixed with a concentrated solution of caustic potash, and boiled in a closed iron boiler under the pressure of steam. The metallic portions of the ores will be left in various states as residua, the other portions being combined with the boiling ley.

[Printed, 3*d*.]

A.D. 1856, May 6.—N° 1061.

BEUDANT, AMEDÉE LOUIS, and BENOIT, JEAN LOUIS MARIE PAUL.—" Improvements in treating ores of copper containing " arsenic and antimony." Copper is separated from the antimony and arsenic contained in the ores " in a metallic state and nearly " pure by a precipitation effected in the melted matt," by the introduction of " a quantity of metallic iron either wrought or " cast." The small quantity of antimony and arsenic that may remain is further precipitated by " adding 1 or 2 per cent. of lead " or galena, and continuing the action of the iron." A considerable quantity of arsenic is volatilised during the operation. If the " matt contains a large quantity of sulphur roasted ore is added" thereto. The antimony and arsenic thus obtained are melted with a mixture of ore and iron pyrites. Lime or roasted ore or a mixture of the two may be added " to the melted matt, and the surface " is covered with charcoal or carbonaceous matter," a metallic button or mass of antimony and arsenic is thus obtained.

If gold or silver be present in the ores they will be concentrated with the antimony and arsenic, and must be afterwards separated from them in the usual way. Suitable apparatus for conducting the process is described with drawings.

[Printed, 6*d*.]

A.D. 1856, May 8th.—N° 1082.

AMORY, JONATHAN.—" Improvements in furnaces," &c. The specification and drawings describe heating and reverberatory and other furnaces, which are made to consume the smoke and gases of combustion by forming hollow fire bridges in the body of the furnaces in connection with suitable passages and apertures. These are so arranged that " the direction given to the burning " gases and smoke by the air issuing from a portion of these

" apertures shall be counter to that of the general progress " through the furnace," whereby they are thoroughly mixed with the heated air and wholly consumed in the furnace.

[Printed, 10*d.*]

A.D. 1856, May 9.—N° 1095.

POTTS, Ferdinand, and VANN, Thomas.—" Certain ma- " chinery for ornamenting, floating, burnishing, and polishing " metallic tubes, part of which machinery is also applicable for " performing the like operation upon other metallic surfaces." Machinery is described, with drawings, for doubly twisting brass or other metallic tubes. The second or reverse twist is given by inserting in the tube an internal tube or mandril, or by filling the tube with sand or soft metal, as lead, and using the twisting machinery described in a reverse direction to that employed for the first process. Perforated external tubes may be attached to internal tubes, composed of metals of a different colour, as brass to zinc, tin, German silver, or plated tubes.

[Printed, 1*s.* 5*d.*]

A.D. 1856, May 17.—N° 1174.

TITTERTON, Charles.—" Improvements in the manufacture " of zinc and zinc white."—*Provisional Protection only.* Refuse matters, skimmings, &c., containing zinc, are melted with broken coke in muffles to produce zinc white. When zinc ores are employed the apparatus is to be arranged with two receiving chambers, and suitable pipes and valves. The first receives the first products, which contain cadmium, the second receives zinc white.

Screens suspended on leather are to be used, which are shaken by suitable rods and stops to detach the oxides from the surface. The white zinc may be subjected to hydraulic pressure.

[Printed, 3*d.*]

A.D. 1856, May 20.—N° 1194.

NEWTON, Alfred Vincent.—" An improved mode of pre- " paring the double chlorides of aluminium and sodium, and aluminium and potassium."—(*A communication from Rousseau,*

Brothers, and P. Morin, of Paris.) The aluminiferous substance is pulverized and mixed with an equivalent portion of sea salt, or chloride of potassium. Charcoal, or tarry, resinous, or bituminous substances are added in such proportions "that there may remain " in the mixture a sufficient quantity of carbon for the reaction." The mixture is calcined into a closed vessel. "The calcined mix- " ture is then introduced into a distillatory apparatus, suitable for " producing the simple anhydrous chloride. Heat is applied there- " to, and dry chlorine is passed through it. When the temperature " is sufficiently high the chlorine will produce a reaction, and " the double chloride will be distilled over and received into a " close vessel in a liquid form; or, instead of chlorine, hydro- " chloric acid gas may be employed." Pure alumina is produced by the calcination of alum, or sulphate of alumina, or impure alumina, argils, pipeclay, or grey argils, kaolin, or any aluminous substance may be used. If a large per centage of iron be present in the substance it is mixed with caabonaceous substances and calcined, and the metallic iron is removed by using suitable acids or mixtures.

[Printed, 3*d.*]

A.D. 1856, May 21.—N° 1201.

DUFRESNE, ALEXANDRE HENRI.—"An improve process of " gilding and ornamenting steel and other metals." Metals not susceptible of direct amalgamation are gilt, silvered, or otherwise ornamented, first by employing "one or several intermediate " metals deposited by chemical, electro-chemical, or mechanical " means."

Secondly, by applying "a protecting matter, as varnish, " bitumen of Judæa, printer's ink, &c., upon the intermediate " metals to form the reserves to be gilded, silvered, or orna- " mented, such reserves being produced by photographic " means, or by a general coating sensible to light, as bitumen of " Judæa."

Thirdly, in "the destruction of the intermediate unreserved " metals, by baths of different kinds," as ammoniacal or acid solutions, chromic acid, &c., "applied so as to preserve the po- " lish," or to act on the metallic surface and produce the required *designs.*

Fourthly, in removing the protecting matters, as varnish, by suitable baths, as hot turpentine.

Fifthly, "in gilding or silvering the surfaces by means of "mercury, and amalgamation and votalising the mercury by "heat."

[Printed, 3d.]

A.D. 1856, May 24.—N° 1234.

BARRON, Pierse Eustace Laurence.—"An improved pro-"cess for coating metals for sheathing ships," &c.—(*A communication.*) Iron or other metallic surfaces are coated with other soft metals or alloys by means of friction. The soft metal or alloy is rubbed over and pressed upon the surface to be coated by means of machinery similar to that used for planing metals, and is "partially fused and abraded."

Artificial heat may be applied to the coating metal or alloy by means of jets of ignited hydrogen gas, or in other ways.

The alloys used may be "composed of two or more of the "following metals, viz., copper, tin, nickel, lead, zinc, antimony, "and bismuth."

Means of attaching plates so coated to ships' sides are also described.

[Printed, 1s. 4d.]

A.D. 1856, May 30.—N° 1282.

WEEMS, James, and McCRINDELL, John Henderson.—"Improvements in the manufacture or working of metals and "their ores." When hot blast is used in working various metals the air is heated by passing it through pipes heated by superheated steam. Double tubes or concentric cylinders are employed, and the air is passed through the inner tube, and heated by steam contained between it and the outer tube or casing.

[Printed, 7d.]

A.D. 1856, June 4.—N° 1330.

HATTON, Edward.—"Improvements in the manufacture of "plain and ornamental metallic tubes." Machinery for forming plain tubes of soft metals, and also ornamenting their surfaces described with drawings.

The skelp or sheet of metal is heated and placed on a table in which there is a groove. The skelp is forced into the groove, and bent by means of attached to and "in the same plane as the "table."

Rolls with figured surfaces are used for ornamenting the tubes whose edges are joined by soldering them.

[Printed, 6*d.*]

A.D. 1856, June 4.—N° 1335.

BROOMAN, Richard Archibald. — "Improvements in "plating glass to render it reflective." — (*A communication.*) Glass is plated "without using mercury or oxide or nitrate of "silver," by depositing on its surface "metallic or other sub- "stances, which are decomposed by the action of acid or acids "as in the galvanic battery, in a gaseous or vapoury form, and "in reducing and fixing such metallic and other plating agents "in such gaseous form by the agency of electricity or galvanism, "or both, upon the glass in a metallic or solid state, whereby glass "will be rendered reflective."

The following are among the substances used, "Black oxide, or "oxide of iron, ethiop's martial, salts of tin, tin in grains, "salts of zinc, acetates of lead, and ammonia, iodine, meta- "gallic salts, chloride of gold," &c. &c.

[Printed, 8*d.*]

A.D. 1856, June 4.—N° 1337.

GIBON, Alexandre Louis, and Fröhlich André.—"Im- "provements in economising fuel in the treatment of metals." The specification and drawings describe an arrangement of furnaces for carrying on the various process of making or working "copper, tin, lead, zinc, cast and wrought iron, and the pre- "cious metals." The object being to retain and use the caloric generated, without allowing it to escape in waste. The various operations are conducted simultaneously, and the ore or metal once fused is to be continuously operated upon in various apparatus in various stages.

[Printed, 1s. 4d.]

A.D. 1856, June 20.—N° 1450.

RADLEY, William.—"Improvements in machinery, apparatus, " materials, and processes for preparing and treating auriferous, " argentiferous, and cupreous rocks, minerals, and alluviums," &c. The specification describes the operations under 6 heads.

The ores are broken small and calcined, they are afterwards plunged into a solution of sulphide of potassium, sodium, barium, or calcium, "more or less concentrated and sulphurated." Sulphide of potassium or "liver of sulphur" is preferred for average ores, 28 lbs. may be used with a ton of ore. Apparatus on the pestle and mortar principle is used for crushing ores, the large pestle being made to revolve on its axis.

A cylindrical amalgamating vessel is described in which a hollow drum with tubular arms and tires is made to revolve.

Pyritic materials before or after the process of auriferous amalgamation, are placed in heaps and sprinkled with acidulated water, and exposed to the action of the atmosphere.

Quartzose or trappean rocks or ores are pulverised and treated with diluted sulphuric acid, or with fluo-silicic or hydro-fluoric gases.

Apparatus for treating ores containing sulphur is described with suitable flues and condensing chambers.

[Printed, *5d.*]

A.D. 1856, June 20.—N° 1458.

JONES, Stopford Thomas, and HARRIS, Josiah.— "An amalgamating machine to extract gold and silver, and to " separate iron from crushed mineral ores in water."—*Provisional Protection only.* A water-tight hollow case in which fans or agitors are made to revolve is to be used. The crushed ores and quicksilver are placed therein and agitated. Magnets are to be used for separating such particles of iron as may be combined with the ores.

[Printed, *3d.*]

A.D. 1856, June 23.—N° 1473.

VIVIAN, Henry Hussey, HERRMANN, Bernhardt Gustav, and MORGAN, William.—"Improvements in the

"manufacture of copper, and in obtaining gold and silver from "the ores employed in such manufacture." "Metallic copper "bottoms" derived from the "smelting process of selecting or "regule making up" are melted and run into water, and calcined, and converted into an oxide. The oxides are fused with sulphurous ores and compounds. They are reduced to a state of regulus, and roasted and smelted "so as to obtain metallic "bottoms, in which the gold is concentrated, and is further "concentrated by repeating the process."

A regulus of improved quality is obtained, which may be treated to separate the silver by the process described in the specification of Letters Patent granted to John Taylor, dated April 15, 1845, (see *ante*, No. 10,614, p. 133,) or in any other convenient way.

[Printed, 4*d*.]

A.D. 1588, July 7.—N° 1858.

CHENOT, Alfred Louis Stanislas, and CHENOT, Eugène Charles Adrien.—"Improvements in sorting ores, "or separating metals from each other, and from certain combi- "nations with other substances." The specification and drawings describe a combination of magnets and electro-magnetic apparatus and sorting machines for sorting and separating particles of iron from other metals found in ores containing them.

[Printed, 1*s*. 1*d*.]

A.D. 1856, July 7.—N° 1589.

CHENOT, Alfred Louis Stanislas, and CHENOT Eugène Charles Adrien.—"Improvements in machinery for com- "pressing metallic sponges and other substances," ores. Stamping and crushing apparatus and machines of various constructions are described at length with the aid of numerous drawings. A hydraulic press is used for stamping, crushing, in which water or other liquid is forced into an air chamber "for the purpose of "storing up into the said chamber, provided with one or more "tubes, a considerable quantity of motive power." This is made use of at will to produce rapid motion.

[Printed, 2*s*. 7*d*.]

A.D. 1856, July 7.—N° 1590.

CHENOT, ALFRED LOUIS STANISLAS, and CHENOT, EUGÈNE CHARLES ADRIEN.—" Improvements in apparatus for the reduc-" tion of metallic oxyds." The specification and drawings describe furnaces in which metals are reduced, either in retorts or by the direct action of heated and burning fuel. Self-acting feeding apparatus is used.

The charge is heated gradually in suitable heating chambers before it is brought to the grate.

[Printed, 10*d.*]

A.D. 1856, July 9.—N° 1619.

DARLINGTON, GEORGE, and DARLINGTON, JOHN.—" Im-" provements in the manufacture or production of zinc or spelter." —*Provisional Protection only.* Zinc ores are crushed and mixed with lime, limestone, or siliceous matter, or oxide of iron and coke. The mixture may be enclosed in a furnace, or in clay tubes, and reduced.

Coal tar may be mixed with the ores.

[Printed, 3*d.*]

A.D. 1856, July 31.—N° 1810.

NEWTON, WILLIAM EDWARD.—" A new or improved process " for obtaining aluminium."—(*A communication from Messrs. Rosseau and Morin, of Paris.* Instead of using retorts of fire clay reducing vessels made of cast or wrought iron, and reducing chambers of brick are employed.

The use of marine soap is dispensed with. The following proportions are recommended to be used,—

Double chloride of aluminium and of sodium	100	parts,
Fluoride of calcium - - - -	50	„
Sodium - - - - -	20	„

The substances are mixed together, and introduced into furnace previously heated to redness.

The aluminium is collected " at the inclined part of the bed, " and may be run off therefrom."

[Printed, 4*d.*]

A.D. 1856, August 14.—N° 1905.

GODEFROY, Peter Augustin.—"An improved treatment of "the matrix of rock quartz, and all like substances for the extrac- "tion of auriferous, argentiferous, and other metals contained "therein." The ores, pyrites, or mundic, are ground to a fine powder, and washed and mixed with $\frac{1}{10}$th or $\frac{1}{8}$th by weight of hydrate of lime, and wetted to form a kind of paste. The mixture is placed in a closed vessel, and submitted to the action of steam under a pressure of about 80 lbs. per square inch. In 4 or 6 hours the liquor is drawn off, the residuum, or metallic deposit, is washed, and metallic particles in a granulated state are produced.

[Printed, 4*d.*]

A.D. 1856, August 20.—N° 1947.

GOSSAGE, William.—"Improvements in obtaining sulphur "and metals from certain ores and other compounds of metals." —*Provisional Protection only.* Sulphurous ores are melted in the usual way, and are to be treated with currents of atmospheric air which are forced up and through the melted mass.

[Printed, 3*d.*]

A.D. 1856, September 1.—N° 2031.

MONCKTON, Edward Henry Cradock.—"Improvements "in blast furnaces for smelting ores."—*Provisional Protection only.* It is proposed to construct furnaces with a great number of orifices in the sides thereof. Into these are fitted tubes for injecting air or gases. The tubes above the surface of the melted metal are to be of larger diameter than those situated below it.

[Printed, 3*d.*]

A.D. 1856, September 4.—N° 2057.

KEATES, William.—"Improvements in the process of re- "ducing copper to the metallic state from ores and other materials "containing copper, and in the furnaces employed therein." Copper ores are brought into the state of matt regulus in the usual way. The regulus is introduced in a furnace, described *with the* aid of drawings, and currents of air, heated or cold, are

forced into or through the melted metal, for the purpose of desulphurizing it.

[Printed, 9*d*.]

A.D. 1856, September 4.—N° 2061.

TABBERNER, JOHN LOUDE.—"Improvements in smelting "ores." The use of large furnaces is proposed to be replaced by that of several small ones working together in combination. The small furnaces discharge their contents from time to time into a common reservoir, whence the molten metal is withdrawn. The blast apparatus is so arranged that it may be directed to the body or belly of the furnace as well as to the hearth thereof.

[Printed, 3*d*.]

A.D. 1856, September 8.—N° 2087.

ESTWANT, FELIX.—"Improvements in casting metal tubes." These relate to casting copper or other metallic tubes. The moulds are made of iron or other substance, having cones or shells of sheet iron or other metal filled with sand. To prevent air bubbles from forming, two channels are connected with the mould, through which molten copper is poured in such a way that it fills the mould from below.

[Printed, 10*d*.]

A.D. 1856, September 8.—N° 2090.

DALTON, ALFRED.—"Improvements in smelting," &c.—*Provisional Protection only*. Atmospheric air or steam is to be introduced into the smelting furnace under pressure, so as to enter near the bottom of the furnace and below the surface of the molten metal contained in it.

The opening by which the molten metal is withdrawn is to be placed so high that a large quantity of melted materials may be always present at the bottom of the furnace.

[Printed, 3*d*.]

A.D. 1856, September 10.—N° 2108.

ROBERT, ALEXANDRE.—"A new process of treating, smelting, "and refining copper, tin, and other refractory metallic ores."

—*Provisional Protection only.* Refractory ores are to be pulverized and mixed with marl or clay diluted with water, and in that state are smelted. The metal is said to be thereby "easily separated "from impurities."

[Printed, 3*d.*]

A.D. 1856, September 15.—N° 2155.

CLEMENTS, Cornelius Ferguson.—"An improvement in "separating copper and other metals from ores containing them." Oxide ores of copper are placed in suitable chambers or furnaces, and are treated with "muriatic acid vapours," conducted from furnaces used in making sulphate of soda, and injected together with steam or water.

The liquids thus obtained are treated in the ordinary way to separate the copper and other metals.

[Printed, 3*d.*]

A.D. 1856, September 18.—N° 2183.

BAGGS, Isham.—"Improvements in smelting or reducing "copper and other metals from their ores, and in the manufac-"ture of sulphuric acid in or by such processes."—*Provisional Protection only.* The ores are mixed either in a calcined or crude raw state with siliceous matter as a flux, and melted. The slag consisting of silicate of iron or other silicate is drawn or skimmed off, and the mass remaining in a molten state is to be treated with currents of air, or oxygen, or other gases. Sulphur and arsenic are quickly driven off, and are recovered by the ordinary methods, and metallic copper is produced.

[Printed, 3*d.*]

A.D. 1856, September 19.—N° 2194.

ROUSSEN, Jean Baptiste Honoré de.—"Improved appa-"ratus for washing and cleansing ores." Metallic sieves are used in combination with metallic brushes for washing pulverized ores. The sieves are partially immersed in water, or water is directed thereon, and the ores are agitated and washed by the action of the metallic brushes.

[Printed, 6*d.*]

A.D. 1856, September 24.—N° 2240.

VION, Charles.—" Improvements in metallic moulds, and in " the manner of using them for casting metals."—(*A communication.*)—*Provisional Protection only.* Moulds for casting bronze are made " of gun or medal bronze, or of brass, or other alloy, or " iron." Outlets or openings are made for the passage of the air. " The opening by which the liquid metal is poured in requires to " be higher than it is usually made, and must be prolonged down " the sides of the mould so that the metal may enter it at several " points."

The mould may be coated with a repellant composition consisting of fatty matters and plumbago.

[Printed, 3*d.*]

A. D. 1856, October 1.—N° 2290.

FONTAINEMOREAU, Pierre Armand le Comte de.— " An improved voltaic battery."—(*A communication from Francesco Selmi of Turin.*) Sulphate of potash is used to form " the exciting " solution or electrolyte." The copper element is placed " in " contact simultaneously with the air, the exciting solution, and " the zinc element, the latter remaining immersed in the solution." By this arrangement a battery of great constancy and duration is said to be obtained.

[Printed, 4*d.*]

A.D. 1856, October 6.—N° 2334.

MACKWORTH, Herbert.—" Improvements in the separation " and treatment of mineral substances, and in coking, and in ap- " paratus connected therewith." Crushing apparatus consisting of a row of stampers actuated by cams and rollers is described with drawings. It may be used for crushing coal and separating shale or other hard incombustible impurities therefrom ; the coal is washed in suitable vessels containing rotating vanes or beaters.

Modifications of the apparatus are used for crushing auriferous ores and washing them. An amalgamating machine is connected therewith. Coking ovens are also described.

[Printed, 1*s.* 9*d.*]

A.D. 1856, October 8.—N° 2359.

WARD, Peter.—" An improved composition for coating the " bottoms of ships." From 15 to 20lbs. of oxide of copper are mixed with about 40lbs. of resin, and added to a cwt. of earthy soap. The earthy soap is made by treating ordinary alkaline soap with muriate of lime, or salts of barium, strontium, magnesium, or alumina.

The composition so formed is applied to ship's sheathing with a brush in the ordinary way.

[Printed, 3*d.*]

A. D. 1856, October 13.—N° 2392.

ELLIOT, George.—" Improvements in the production of oxides " of manganese." These relate to the production of oxide of manganese from "the solutions of chloride of manganese arising " from the manufacture of bleaching powder or otherwise." The iron which may be contained in the solution is precipitated by carbonate of lime or chalk. From the clear solution remaining a protoxide of manganese is separated by precipitation by means of lime. Other processes are described for using the precipitated protoxide of manganese for precipitating iron from the chloride solutions and recovering therefrom " a mixed protoxide and " peroxide."

[Printed, 3*d.*]

A.D. 1856, October 21.—N° 2475.

PATTINSON, Hugh Lee.—" Improvements in the treatment " of certain salts and oxides of manganese."—*Provisional Protection only.* Soluble salts of manganese (such as the chloride) are dissolved in water. An earthy or alkaline precipitate, such as lime, is added thereto to precipitate oxide or mixed oxides of manganese. These are separated, washed, dried, and heated at a temperature "considerably below the melting point of tin." Peroxide of manganese is thereby to be obtained in large proportion.

[Printed, 3*d.*]

A.D. 1856, October 29.—N° 2537.

WYCHE, Thomas Eyre.—" A method of disengaging metals " from the matrix."—(*Partly a communication.*) — *Provisional Protection only.* Quartz, ores, and other substances containing metals, are broken in pieces and are to be treated in a close vessel, under the pressure of steam, with caustic alkali diluted with water.

The quartz is to be thereby dissolved, leaving a free metallic residuum.

[Printed, 3*d.*]

A.D. 1856, November 5.—N° 2596.

TITTERTON, Charles.—" Improvements in the manufacture " of zinc and zinc white." The invention relates to a method " of employing the refuse skimming and dross " " obtained from " various branches of manufacture where zinc is employed." These are melted in muffles mixed with $\frac{1}{8}$ of their weight of coke or carbon.

Apparatus consisting of double chambers is used for collecting and separating the two products, oxide of cadmium, which is first produced, and white oxide of zinc, which is afterwards pressed by hydraulic pressure. The wire-gauze screen used is shaken to detach the oxides deposited thereon.

The white oxide is rendered more dense by heating it to a white heat and suddenly cooling it.

[Printed, 8*d.*]

A.D. 1856, November 8.—N° 2630.

GOSSAGE, William.—" Improvements in the manufacture of " carbonates of zinc, of iron, and of manganese, and in the useful " application of such carbonates." Carbonates of zinc, iron, or manganese are manufactured " by decomposing solutions of " sulphates or chlorides of those metals by means of carbonate of " magnesia or caustic magnesia." Carbonates of zinc and iron " may be decomposed by carbonate of lime or caustic lime." The hydrated metallic oxides produced are " converted into car- " bonates by means of carbonic acid gas."

Modes of applying the metallic carbonates in the production of metallic sulphurets, and carbonate of soda, and oxide of manganese, are described.

[Printed, 4*d.*]

A.D. 1856, November 8.—N° 2632.

REID, ARCHIBALD.—" Improvements in treating iron, so as to " render it impervious to continuous oxidation."— *Provisional Protection only.* The surfaces of the iron are to be covered "with " soot or other matters composed of the same elements," "and " possessing the same properties," and exposed to a red or white heat in a suitable furnace for about 15 or 30 minutes. The surface, when cooled and cleansed, will be "covered with a coating " impervious to rust under ordinary circumstances."

[Printed, 3*d.*]

A.D. 1856, November 14.—N° 2696.

REID, ARCHIBALD, and O'NEIL, CHARLES.—" Improvements " in treating metallic ores to obtain copper." Copper ores, especially those of a poorer sort, containing 1½ to 3 per cent. of metal, are crushed and mixed with about $\frac{1}{10}$ part by weight of kelp. The mixture is dried and melted in a reverberatory furnace.

The calcined mixture of ore and kelp is placed while red hot in boiling water, the boiling whereof is continued until the metallic salts are dissolved. The solution is allowed to settle; the supernatant liquor is run off into tanks containing scrap iron, and copper is precipitated. The precipitate is melted and refined in the usual way.

[Printed, 3*d.*]

A.D. 1856, November 14.—N° 2699.

AITKEN, JOHN.—" Improvements in the furnaces employed in " the manufacture of iron or other metals."—*Provisional Protection only.* A fan or air pump, or other exhausting apparatus is proposed to be connected with furnaces used in working metals. Heated air, or air mixed with oxygen, or carbonizing gases may be introduced into the furnace.

[Printed, 3*d.*]

A.D. 1856, November 21.—N° 2768.

CLARK, ALEXANDER.—"Improvements in the application and "construction of revolving window shutters and blinds, and "metal window sashes." Revolving or roller window shutters are described. A thin plate or coating of brass is applied to the surface of iron bars employed in making sashes and shutters, and soldered or cemented, or otherwise fastened thereto. The baser metal thus coated is drawn or rolled.

[Printed, 11*d*.]

A.D. 1856, November 25.—N° 2796.

ELKIN, JACOB LEVI.—"An improved process applicable to the "manufacture of zinc."—(*A communication.*) The grey oxide or suboxide of zinc obtained in the distillation process is found to consist of globules of a spherical form, which are very difficult of fusion in their ordinary state. But by heating them nearly to the point of fusion, and then agitating and pressing them so as to flatten the globules and bring their surfaces into close contact they may be melted and reduced to metallic zinc.

Suitable apparatus is described with drawings for carrying on the process.

[Printed, 10*d*.]

A.D. 1856, November 26.—N° 2805.

NEWTON, ALFRED VINCENT.—"An improvement in the "process of coating iron bolts, bars, sheets, spikes, nails, and "other articles of iron, with metallic alloys, for the prevention of rusting or oxydation."—(*A communication from Joseph Poleux*, of *New York*.) The articles are prepared by cleansing them in acid (by preference muriatic), which is used undiluted, as muriatic 18° Beaume, nitric 38°, and sulphuric 66° Beaume, or thereabouts. Spelter is placed in the acid with the articles (about a pound of spelter with half a ton of iron spikes or bolts), the seizes on the spelter and dissolves it, and rapidly deposits it in a thin film on the surface of the iron, which then becomes protected. Articles not unusually rusty, are cleansed in about a minute. After being taken out they are without further treatment passed immediately but gradually ("to prevent the metal from spluttering about") into the bath of melted alloy with which they are to be coated.

Lead being cheap, may be used in large proportions; the following are recommended,—to form 100 parts, take 15 tin, 75 lead, 5 copper, 5 regulus of antimony; or 15 tin, 85 lead.

[Printed, 3*d*.]

A.D. 1856, December 2.—N° 2861.

SIEMENS, FREDERIC. — "Improved arrangement of furnaces, " which improvements are applicable in all cases where great " heat is required." Furnaces are described, with the aid of drawings, which have chambers called regenerators, in connection with the fire grate. The heated flames and gases, in passing from the fire grate to the chimney are made to pass through a regenerator chamber, where by means of partitions or numerous passages, the heated products are made to impinge on an extended surface of brick, and there deposit the heat they had carried off with them, before they find an exit in the chimney.

Two or more chambers may be used in connection with one fireplace. The incoming cool currents of air are made to pass through the chamber heated by the outgoing currents, and so recover and take up the heat deposited, and enter the fire grate in a heated state.

[Printed, 1*s*. 5*d*.]

A.D. 1856, December 3.—N° 2870.

DEELEY, JOSEPH.—"Improvements in furnaces for smelting " and melting." Double or single furnaces are used, the former having a repetition of the parts of the latter with a common chimney. The air enters through grate bars fixed in the brickwork on each side of the furnace, and passes into it through an opening in the brickwork.

The coke or fuel and metal to be melted are fed into separate compartments; the melted product runs into a receptacle at the bottom of the furnace, whence it is tapped in the usual way. Each chamber is diminished in width at the top above the charging doors to concentrate the heat.

[Printed, 9*d*.]

A.D. 1856, December 9.—N° 2922.

MUSPRATT, EDMUND KNOWLES, and GERLAND, BALTHASAR WILHELM.—" Improvements in treating waste liquors

" produced in the manufacture of chlorine, and in separating " nickel, cobalt, and copper from liquids containing them, in com- " bination with manganese and iron."—*Provisional Protection only.* The liquid which runs from the still used in manufacturing chlorine is to be made to precipitate iron by adding thereto carbonate of lime. The solution is filtered and sulphuretted hydrogen is added to precipitate copper; the solution is again filtered, and sulphuret of calcium is added to precipitate cobalt, nickel, and manganese partially. The manganese may be dissolved out by muriatic acid; it may also be precipitated by adding lime. The cobalt and nickel may be separated by the usual processes, or by precipitating with oxalate of lime.

[Printed, 3*d.*]

A.D. 1856, December 12.—N° 2957.

PEASE, Henry, and RICHARDSON, Thomas.—" Improve- " ments in the manufacture of compounds of alumina." About " 4 cwt. of ordinary china clay, containing 45 per cent. of alumina," are mixed with 1 cwt. of common salt, and calcined for about an hour. The calcined mass is sifted and ground, then placed in a reverberatory furnace. About 7 cwt. of sulphuric acid (sp. gr. 1·640) are added thereto; the mass is agitated, and when it becomes a dry powder it is exposed for some days to the action of the atmosphere. Alum may be separated therefrom by lixiviating in water, and crystallizing in the ordinary way.

[Printed, 3*d.*]

A.D. 1856, December 16.—N° 2980.

GERHARD, Frederick William.—" Improved means of " obtaining aluminium metal and the adaptation thereof to the " manufacture of certain useful articles." Powdered fluoride of aluminium is placed alone or in combination with other fluorides in a closed furnace, heated to a red heat and exposed to the action of hydrogen gas which is used as a reagent in the place of sodium. A reverberatory furnace is used by preference. The fluoride of aluminium is placed in shallow trays or dishes, each dish being surrounded by clean iron filings placed in suitable receptacles; dry hydrogen gas is forced in and suitable entry and exit pipes and stopcocks are provided. The hydrogen gas combining with

the fluorine "forms hydro-fluoric acid, which is taken up by the "iron and is thereby converted into fluoride of iron." The resulting aluminium "remains in a metallic state in the bottom "of the trays containing the fluoride," and may be used for a variety of manufacturing and ornamental purposes.

[Printed, 4*d*.]

A.D. 1856, December 17.—N° 2992.

COWPER, CHARLES.—"Certain improvements in electro-"plating."—(*A communication from Louis T. Caussinus, of Paris.*) —*Provisional Protection only*. 4 oz. of cyanide of copper and 10 oz. of cyanide of potassium are dissolved in a pint of hot water, the solution is filtered, and mixed with 20 pints of water; 2 oz. of cyanide of silver, and 10 oz. of cyanide of potassium, are dissolved in a pint of water, the solution is filtered and added to the solution of copper. The silvering bath thus composed is heated and kept hot for an hour, and may be used hot or cold. A galvanic battery of zinc and carbon may be used.

[Printed, 3*d*.]

A.D. 1856, December 26.—N° 3073.

DEELEY, WILLIAM CLARKE.—"Improvements in reducing "copper ores."—(*A communication.*)—*Provisional Protection only*. —It is proposed to crush the copper ores in the usual way, and if they contain much chalk they are sprinkled with vinegar.

The ores are then saturated in a vessel with muriatic acid, and well stirred.

The liquor is run off and is precipitated upon iron in suitable vessels.

Poor ores may be thus treated with advantage.

[Printed, 3*d*.]

A.D. 1856, December 31.—N° 3101.

MADDEN, PETER.—"Improvements in furnaces," &c. "for either "heating of drying kilns, roasting of substances, or heating of "boilers."—*Provisional Protection only*. Metallic plates or tubes, or both conjointly, are placed in contact with the fire in the

furnace, and seem to be intended to communicate directly with the kiln and substances placed therein to be roasted. The heat generated is said to be increased.

[Printed, 3*d*.]

1857.

A.D. 1857, January 1.—N° 5.

NOUALHIER, Eugène Theodore, and PRÉVOST, Jean Baptiste.—" Improvements in applying metals," &c. These relate to the application of metallic coatings, as of copper, to the surfaces of hard vitrified substances, as pottery; or soft substances, as leather, caoutchouc, or gutta percha. The surfaces are varnished and then coated with leaf copper or metallic powder, and then coated with copper by the electro process. A coating of gold, silver, or platinum may be subsequently deposited on the copper.

[Printed, 3*d*.]

A.D. 1857, January 5.—N° 39.

BRAITHWAITE, Frederick.—" An improved mode of ex- " tracting the iron from tin ores."—*Provisional Protection only.* Tin ores are stamped, washed, and calcined, and the particles of iron contained therein are to be separated by using suitably arranged magnets.

[Printed, 3*d*.]

A.D. 1857, January 7.—N° 57.

CLAUS, Charles Frederick.—" Obtaining tin or compounds " of tin from the scraps or clippings of tinned sheet iron." Tin is separated from scrap or refuse tin plate by placing the scrap in a suitable vessel and dissolving the tin in boiling solutions of sulphurets of calcium containing sulphur in excess, or to which free sulphur is added. Alkali waste and gas waste substances may be used. The solution of tin thus obtained is treated with,

by preference, muriatic acid. Bisulphuret of tin is precipitated, and is dried and roasted and converted into oxide of tin, and made into metallic tin, in the usual way.

[Printed, 4*d*.]

A.D. 1857, January 7.—N° 59.

PILKINGTON, Peter, and ENTWISLE, Thomas.—"Improvements in machinery or apparatus for washing, cleaning, "agitating, grinding," &c.—*Provisional Protection only*. The provisional specification describes, with drawings, a vessel "placed "upon two excentrics, and driven by pullies or toothed gearing, "which give it an excentric motion, and the gravity of the vessel, "aided by the friction of the excentrics, causes it to acquire a "circular motion, thus efficiently agitating and changing the "position of the contents."

[Printed, 9*d*.]

A.D. 1857, January 9.—N° 82.

GIBBS, Joseph.—"Improvements in extracting gold and silver "from their matrices and from other substances," &c.—*Provisional Protection only*. It is proposed to combine the washing and grinding and amalgamating processes. Auriferous or argentiferous deposits are washed and so concentrated, and then ground.

Nitre is mixed with quicksilver in the amalgamating process.

[Printed, 3*d*.]

A.D. 1857, January 14.—N° 116.

HADDAN, John Coope.—"Improvements in smelting ores "and in roasting and extracting products therefrom."—(*A communication.*) Furnaces for smelting ores are described with the aid of drawings. Exhaust apparatus is employed. The waste heat is applied to roasting or partially roasting ores.

Suitable feeding apparatus and an inclined interior passage are used to supply the charge to the furnace.

[Printed, 6*d*.]

A.D. 1857, January 21.—N° 178.

AITCHISON, Robert Ker.—"Improved apparatus for the "amalgamation of precious metals."—*Provisional Protection only*.

It is proposed to mix crushed ores of the precious metals or other substances containing them with hot water, and amalgamate them with mercury in a close steam-tight vessel. Currents of steam are introduced into the vessel, and aid in the amalgamating process.

[Printed, 3*d.*]

A.D. 1857, January 22.—N° 189.

WARNE, JAMES.—" A new combination of metals applicable to " decorative and useful purposes, part of which invention is " applicable also to the method of combining metals and alloys of " metals." An alloy suitable for forming the surfaces of tables and other articles is made by mixing with block or ingot tin 1 cwt., nickel 7 lbs., bismuth 7 lbs., cobalt 3 lbs.; for a back or base, the alloy used may be common pewter or lead " hardened with regulus " or spelter."

Alloys of metals are soldered or fused together in strata of the required thickness by pouring a layer in a suitable mould to form a base. When it has set, its upper surface is fused by applying a perforated hot plate, which is withdrawn, and a second layer of alloy is poured on the fused surface, and is united and may be rolled therewith.

[Printed, 3*d.*]

A.D. 1857, January 23.—N° 203.

BEDSON, GEORGE.—" Improvements in coating iron and other " metals with metals or metallic compounds."—Metals are coated or galvanized or tinned by passing them through a bath of melted metal, on the surface of which salts of zinc are made to float. By preference, the chloride and sulphate are used with common salt, chlorides of lead and manganese to make the metal run freely.

[Printed, 3*d.*]

A.D. 1857, January 23.—N° 209.

POWELL, JOHN FOLLIOTT.—" Improvements in reverberatory " and other furnaces." The supply of air to furnaces is regulated by closing the upper part of the ash pit in front by flaps, or

by folding doors; or the ash pit may be entirely closed in the front and air be admitted through holes in the lower part of the doors. Or suitable air passages may be made "under the floor, "or at, or under, the sides of the ash pit." Suitable regulating valves are described. Air may be introduced in a heated state into the fire place, above the bars, and be supplied by suitable flues "to the body, neck, or stack of the furnace."

[Printed, 5*d.*]

A.D. 1857, January 27.—N° 240.

BOUSFIELD, George Tomlinson.—"Improvements in coat-"ing iron or other metals with tin."—(*A communication.*) A tinning solution is formed by dissolving 7½ oz. of cream of tartar in 100 lbs. of water, and adding 1 oz. of common whiting and mixing therewith a solution of 3½ oz. of "the common tin "salt of commerce" dissolved in 10 lbs. of fresh water. The solution is heated in a vessel of wood or porcelain to about 160° F. The metal to be coated is immersed therein with scraps of zinc about 2 lbs. weight or more, and pure tin will be deposited.

[Printed, 3*d.*]

A.D. 1857, January 29.—N° 265.

BUSSY, Charles de.—"The reduction of zinc ores."—Zinc ores are smelted in a blast furnace, the gases with the vapour of zinc are passed through a second blast furnace, into which "they are introduced at a short distance from the tuyeres." After "traversing a part of the column of fuel contained" therein the gases are passed into a series of chambers and condensed.

A single blast furnace may be used,—it has two sets of tuyeres, one being near the top the other near the bottom. The gases produced by both sets of tuyeres pass at an intermediate height through condensing chambers. Drawings are shown.

[Printed, 1*s.* 1*d.*]

A.D. 1857, January 31.—N° 295.

PRICE, Astley Paston.—"Improvements in the separation of "of gold from certain auriferous mixtures, compounds, and *products.*" Auriferous compounds or mixtures are converted

" into an auriferous regulus or artificially prepared sulphurretted " compound" consisting "essentially, by preference, of either " sulphuret of iron, or sulphuret of copper," or both. These are subjected to calcination with or without salt. Gold is extracted therefrom by dissolving "in an aqueous solution of chlorine, or " an acidified hypochlorite." From these solutions gold is precipitated by means of "protosulphate of iron, or other pre- " cipitating agent."

[Printed, 4*d*.]

A.D. 1857, February 7.—N° 354.

CADIAT, Joseph Nicolas Victor.—" The application of cen- " trifugal force in purifying minerals or any other similar hard " substances by washing." Crushed ores or other materials are introduced with water into a rotating vessel, by means of a hollow central shaft. The water and ores descend to the lower part of the vessel, and as it rotates are driven by the centrifugal action to the circumference, and there the lighter particles rise to the upper part of the vessel, and are driven off as waste. The heavier metallic particles are collected at the lower part of the vessel.

[Printed, 9*d*.]

A.D. 1857, February 9.—N° 367.

TAYLOR, James.—" Improvements in machinery for crushing " various substances."—*Provisional Protection only.* A roller, having a rough serrated surface and adjustable bearings, works in connection with a hollow bed or concave surface. The ores are to be fed in between the roller and bed, and suitable sieves and sifting apparatus may be connected therewith.

[Printed, 3*d*.]

A.D. 1857, February 9.—N° 373.

HARDING, John.—" Improvements in the treatment of me- " tallic ores." The ores, such as iron stones, are, before they are calcined or smelted, subjected to the action of heat and steam in suitable closed vessels with water. By this process "shale and " other foreign matters" are readily separated from the ores."

[Printed, 9*d*.]

A.D. 1857, February 10.—N° 386.

BEDSON, George.—"Improvements in coating metal with "metal and metallic compounds." In coating or galvanizing or tinning metals (by passing them through a bath of molten metal) instead of employing sal ammoniac or tallow, as a covering surface to the bath, salts of tin, as the "chloride, perchloride, or sulphate," are used, with common salt or other suitable substance which will make the metal run freely.

[Printed, 3*d.*]

A.D. 1857, February 10.—N° 387.

PARTZ, August Frederick William.—"An improved "method of evaporating fluids, condensing, and absorbing "vapors, gases, and fumes, arresting and precipitating floculent, "metallic, or other particles," &c. Perforated discs are dipped into a liquid and metallic or other fumes or vapours which it is desired to condense are forced through them. Or the perforated discs are immersed in a fluid, and the fumes forced through them and the fluid.

[Printed, 7*d.*]

A.D. 1857, February 11.—N° 398.

PITMAN, John Talbot.—"An improved system of working "metallic ores and their products, both metallic and mineral."—(*A communication.*) A compound furnace of a complicated construction is described with drawings. The ore is pulverized, and may be mixed with fuel or fluxes, and made into bricks or blocks. The ore is melted in the first furnace and finished in the second. Pressing apparatus is used for casting under pressure. It is proposed to cast ships' bottoms entire.

[Printed, 1*s.* 8*d.*]

A.D. 1857, February 17.—N° 462.

WITHNALL, Thomas.—"Improvements in the manufacture of "copper, brass, or other metallic rollers or cylinders."—*Provisional Protection only.* Two tubes of copper, tin, or their alloys (an inner small, and an outer large one) are proposed to be united by pouring in between them a suitable metal or alloy, so as to form a roller of the requisite thickness.

[Printed, 3*d.*]

A.D. 1857, February 18.—N° 472.

GREEN, JACOB.—"Improvements in furnaces for burning com-"bustible gases under pressure in the manufacture of glass, iron, "and other metals." Furnaces are described with drawings, in which the chimney is dispensed with. Air is forced into the ash pit, and "to complete the combustion of the gases, is forced into "the furnace from a conveniently arranged blower."

Suitable dampers are used for allowing spent gases to escape, and for regulating the pressure of air in the furnace.

[Printed, 6*d.*]

A.D. 1857, February 24.—N° 541.

PARKES, ALEXANDER.—"Improvements in separating tin from "tin plate scrap, and tin or zinc from other surfaces of iron." About a ton of sulphuric acid of sp. gr. about 1·65° to 1·85° is put in a suitable vessel, and heated to about 200° F. Into the acid from 2 to 3 cwt. of tin scrap are introduced; in about 20 minutes the tin will be dissolved, and the iron left with a clean surface. The iron may be worked up and the tin separated from the acid by the ordinary processes. Or the solution of tin may be peroxydised by using chlorine, "when the tin will be separated as "an oxide." Mercury may be used to separate tin from tin scrap. About 20 lbs. of mercury are placed in an iron barrel or suitable vessel, from 1 to 2 cwt. of tin scrap may be introduced, with or without water, or weak acid; the temperature is raised to about 70° or 100° F. The barrel is set in motion, in about half an hour the tin is separated from the iron and amalgamated with the mercury. The mercury may be distilled off, and metallic tin is obtained.

[Printed, 4*d.*]

A.D. 1857, March 10.—N° 700.

HAMILTON, JAMES.—"Improvements in coating iron and "other metals with metallic substances." These consist in coating iron or other metals or compounds, which have been previously coated with tin, or zinc, or their compounds, with lead or its compounds, such as 1 part of mercury or tin and 8 parts of lead, or the lead may be increased to $\frac{2}{3}$ of the whole or thereabout.

Sheets of metal, after being cleansed by immersing them in suitable pickles, are coated with China or tea lead by dipping them in a bath of that metal melted.

[Printed, 3*d.*]

A.D. 1857, March 16.—N° 741.

BROOMAN, Richard Archibald.—" Improvements in zincing " or coating metals with zinc, and in cleaning metals."—(*A communication.*)—*Provisional Protection only.* Metallic surfaces when cleansed are to be rubbed by the aid of cork with an amalgam of zinc in powder. The amalgam may be composed of " zinc in " powder, and a salt of mercury dissolved in hydrochloric acid," or of " zinc in powder and of ammoniacal salt in excess in chloride " of zinc, with excess of acid." The process may be carried on cold, but, if convenient, the surfaces should be heated.

[Printed, 3*d.*]

A.D. 1857, March 18.—N° 767.

JOHNSON, Richard.—" Improvements in cleaning iron and " other metals after the manner known as 'pickling.' "—*Provisional Protection only.* The pickling solution is to be contained in air-tight vessels, and when the metallic surfaces required to be cleansed are immersed therein the air is withdrawn or excluded in any convenient way.

[Printed, 3*d.*]

A.D. 1857, March 25.—N° 826.

OUDRY, Charles François Léopold.—" Improvements in " the preservation of articles of cast, wrought, rolled, and forged " iron, zinc, and other metals or alloys of metals against oxida- " tion from humidity, and other destructive effects of air and " water." Copper in "a pure state" is deposited by electricity in any required thickness upon metallic articles. The surfaces of the metals or alloys require no previous cleansing from oxide; they are first brushed, then dipped once or several times in a hot or cold liquid varnish and dried, then they are dipped in another liquid or metallic varnish. The varnishes employed vary according to the nature of the article coated, and the metal or alloy of

which it consists. Bitumen, copal, distilled essences,—as ether, chloroform, naphtha, siccative oils,—caoutchouc, gutta percha, white lead, plumbago, copper powder are employed for varnishes.

The varnish when dry is rubbed with a hard hair brush, the article is suspended in a bath of solution of sulphate of copper, and is coated by electric agency in the usual way. The intermediate coating of metallic varnish is said to prevent galvanic action between various metals, and preserves them from oxydation.

[Printed, *3d.*]

A.D. 1857, March 31.—N° 887.

GOODE, Samuel Jabez.—" An improvement or improvements " in depositing metallic alloys by electricity." Instead of employing plates composed of the alloys to be deposited, separate plates, each consisting of one of the simple metals forming the alloy, are used. Thus, in depositing brass, a plate of copper and a plate of zinc are suspended, both being connected with the copper or negative end of the battery. The composition and nature of the deposited alloy, and the relative quantities of each metal sent down, may be regulated at pleasure by altering the position of either plate in the solution, or if two much of either metal is being deposited, withdrawing it for a time.

[Printed, *3d.*]

A.D. 1857, April 8.—N° 989.

EDWARDS, Edmund, and BEACHER, Edward. — " Improvements in machinery or apparatus for washing or cleansing " mineral and other substances." Screens or gratings in one or more sets, are arranged over or within cisterns of water. The water is made to rise and fall by sudden pulsations. The lighter portions of the ores, coals, or other substances are driven upwards, and over the side of the screen, the heavier fall through. The portion driven over may be caught on another grating or set of screens, and be again washed.

[Printed, *7d.*]

A.D. 1857, April 16.—N° 1081.

HANDS, Johnson.—" Improvements in kilns and in furnaces " and flues for withdrawing air and vapours from drying and

" other chambers." Two kilns or drying furnaces combined are described with drawings. Suitable flues and passages and drying chambers connected by pipes or passages with the external air are described. The return flues are made of iron instead of firebrick, and openings are formed therein.

[Printed, 2s. 3d.]

A.D. 1857, April 25.—N° 1175.

BURROW, Rev. James.—" Improvements in coating wrought " iron." A trough is used in which are fixed straps or thin pieces of metal, with the ends bent upwards and projecting, and arranged in alternate layers in a horizontal position. The projecting ends are connected by a conducting medium or metal, and one termination of the series is dipped into an acidulated solution, and the other is immersed in a vessel containing hot water, or an alkaline, or weak salammoniac solution. The series of straps is insulated in the trough by the interposition of non-conducting media. When the series of straps is alternately zinc and copper, diluted sulphuric acid is used, with tin and copper diluted muriatic acid, with lead and copper diluted nitric acid may be used. The trough is filled with a weak solution of the coating metal, about an ounce to six gallons of water; the sheets of metal required to be coated are immersed therein in contact with the zinc or coating metal of the series of straps. Exciting agents may be used as described, or are dispensed with. Methods of applying to and fusing upon metals a vitreous coating are described.

[Printed, 4d.]

A.D. 1857, April 29.—N° 1203.

AITKEN, John.—" An improvement in furnaces for melting " the materials of glass, iron, and other metals," &c.—*Provisional Protection only*. It is proposed to construct furnaces so that the fire may not act directly on the metals. This is to be done by making " on each side of the fire-bars a thin partition from the " bottom or floor to a flue in the top of the furnace. The flue " is to wind round the furnace chamber in the wall, either trans- " versely or longitudinally, and to be connected with a fan or air " pump outside of the furnace."

[Printed, 3d.]

A.D. 1857, April 30.—N° 1225.

COLLINS, John. — "Improvements in furnaces and flues, and "in kilns and drying chambers." The bars of the furnaces are made of fire brick or other earthy matter, the bottoms are made of perforated slabs of fire-brick, supported on iron bars or plates. Toothed or serrated plates or bridges are placed in the flues of boilers, or of salt pans, or other vessels required to be heated. Compound kilns or drying chambers are described with drawings; they are heated by two furnaces, and are provided with a series of heating tubes or channels, suitably arranged. The materials to be dried are placed upon perforated zinc plates.

[Printed, 1*s*. 1*d*.]

A.D. 1857, May 6.—N° 1274.

BECKER, Johann Philippe.—"Improvements in the mode of "silvering animal, vegetable, and mineral objects." The objects to be silvered are brought into contact with a fluid composition, formed of metallic or vegetable acids, mixed with water, and a solution of silver, to which "alkalis, grape or milk sugar, chlorine, "fluorine, potassium, calcium, sodium, or metallic oxides, or "essential oils," are added "according to the nature of the "object required to be silvered, and of the bases to be changed." 2 parts of caustic lime, 5 parts of grape or milk sugar, 2 parts of "racemic acid" (or, in place thereof, "carbonic oxide of soda or "potassium, or gallic acid may be substituted), and mixed with "650 parts of distilled water." A second mixture is prepared by dissolving 20 parts of nitrate of silver in 20 parts of liquid ammonia, and adding thereto 650 parts of water. Equal parts of the two mixtures are combined to form a silvering solution. Modes of silvering fibrous materials and animal and vegetable substances are described.

[Printed, 4*d*.]

A.D. 1857, May 11.—N° 1320.

SIEMENS, Charles William,—"Improvements in furnaces, "and in the application of heated currents." Furnaces are described with drawings, in which currents of air are highly heated, so as to be applicable "for roasting ores, oxidizing,

" smelting, and refining metals," and other purposes where the direct action of or contact with the flames or ignited gases of combustion would be injurious.

The currents of air are heated in suitably constructed chambers or regenerators, where they impinge upon heated surfaces of fire brick or other refractory materials. Two or more chambers may be used, and be worked alternately in combination; in one of them the in-coming currents of cold air are heated, in the other the out-going currents of heated air deposit their heat.

[Printed, 2*s*. 8*d*.]

A.D. 1857, May 12.—Nº 1334.

WESTLAKE, JOHN.—" Improvements in cleaning, separating, " and dressing ores of pulverised tin, copper, lead, silver, and " other minerals, ores, and substances."—*Provisional Protection only*. Pulverised ores, especially those of tin, are proposed to be washed in double cisterns, working in connection with one another. The ores are first washed in a cistern, having a conical bottom, in which the heavy particles are collected, and from which they are removed by a sliding door; the lighter particles are carried upwards by the water and pass over the side into the other cistern or compartment, where they are again washed. Several double vessels or cisterns may be worked in connection. A filter is used to separate tin and slime from the waste water.

[Printed, 3*d*.]

A.D. 1857, May 19.—Nº 1405.

SPARRE, JULIUS FRIEDRICH PHILIPP LUDWIG VON.—" Im- " provements in separating substance of different specific gravities, " and in the machinery and apparatuses employed therein." Four machines are described with drawings. In the first the substances are washed by water, poured upon inclined surfaces, on which are suitable projections or partitions; in the second, they are washed in a rotating cylindrical vessel, which, by the action of centrifugal force, separates the particles according to their respective specific gravities. The third machine consists of an inclined surface, on which the materials are fed from a spout, and are conveyed along by the current to a reservoir at the other end.

The fourth machine consists of a washing pan, having a broad flange inclined upwards, and made to rotate by means of a vertical shaft.

[Printed, 11*d.*]

A.D. 1857, June 1.—N° 1540.

WALENN, WILLIAM HENRY.—" Improvements in the electric " deposition of metals and metallic alloys." These relate to the solutions employed, which are aqueous solutions of cyanide of potassium and tartrate of ammonium.

The proportions recommended are,—

For copper	1 part of tartrate of ammonia,			8 cyanide.	
For silver	5	"	"	1	"
For gold	3	"	"	1	"
For bronze alloy	1	"	"	6	"

For brass alloy, equal parts of both.

In this menstruum, cyanides, tartrates, carbonates, or any other suitable salt or compound of the metal to be deposited are dissolved. For depositing alloys of metals the proportions of tartrate and cyanide must be varied as required.

[Printed, 4*d.*]

A.D. 1857, June 5.—N° 1589.

MUSPRATT, EDMUND KNOWLES, and GERLAND, BALTHASAR WILHELM.—" Improvements in treating waste liquors " produced in the manufacture of chlorine, and in separating " nickel, cobalt, and copper from liquids containing them, in " combination with manganese and iron." Nickel, cobalt, copper, and oxide of manganese are separated from the manganese ores ordinarily used in making chlorine, and which are in a state of solution; first, by separating iron as a peroxide by means of carbonate of lime or other suitable substance. The remaining solution is then decanted, and by means of sulphuretted hydrogen gas sulphuret of copper is thrown down. The impure sulphuret of calcium or soda waste may be used to precipitate nickel and cobalt. Manganese is separated from the liquor remaining, after precipitating cobalt and nickels, by using lime.

[Printed, 3*d.*]

A.D. 1857, June 16.—N° 1683.

EDWARDS, William Alexander.—"Improvements in "apparatus for separating iron and other matters from ores and "other substances."—*Provisional Protection only.* The ores are to be pulverized, and in a state of powder are to be brought into direct contact with magnets. The ores may be fed by a hopper into a revolving cylinder, and so be brought into contact with magnets which separate all the particles of iron.

[Printed, 3*d.*]

A.D. 1857, June 16.—N° 1688.

GOULDING, Richard.—"Improvements in the extraction of "gold and silver, and other metals." Pulverized auriferous or argentiferous ores, or alluvial deposits, are first prepared by sifting or washing them, and then are introduced into a vessel in which paddles are made to revolve like those of a screw propeller, they are thereby ultimately amalgamated with the quicksilver. Suitable pipes are provided for conducting the water and carrying off the washed ores. Heat may be applied to quicken the action of the quicksilver.

[Printed, 1*s.* 4*d.*]

A.D. 1857, June 22.—N° 1742.

KNOWLES, Sir Francis Charles.—"The mannfacture of "aluminium, and of certain re-agents to be used therein."—Aluminium is obtained "by passing the vapour of the chloride of "aluminium through, or otherwise combining the same in the "form of melted chloride, or its vapour, with melted cyanides" of potassium, or of sodium, or their vapour, "by the double decom-"position chloride of sodium or chloride of potassium, and the "metal aluminium (which can readily be collected and fused)," are obtained.

To form the cyanides, anhydrous carbonate of potash or soda may be mixed in proper proportions with fine charcoal, and heated so as "to convert the carbonic acid into carbonic oxide," and "to decompose the alkali. The mixture is placed in a chamber of fire clay, brick, or iron, with lumps of charcoal, and heated currents of gases, such as the waste gases from iron blast

furnaces, are passed into the chamber. The nitrogen of the gases "combines with the charcoal to form cyanogen, and this, "uniting with the metallic base of the decomposed alkali, forms "a vapour of the cyanide required, which can be collected by "sublimation in appropriate chambers, and cooled."

[Printed, 3*d.*]

A.D. 1857, June 24.—N° 1759.

MORCOM, Richard.—"Improvements in dressing ores." The stampers used in dressing and crushing ores are made to turn round on their vertical axes as they descend, so as to equalize the wear of their under surfaces.

Self-acting valves are placed in the floor of the "puddle," so that the waste matters are easily discharged, instead of being removed by manual labour.

[Printed, 6*d.*]

A.D. 1857, June 24.—N° 1766.

PARKES, Alexander.—"Improvements in coating metals "with other metals."—*Provisional Protection only.* Zinc, or other metal positive to the metal to be coated, is added in a granulated or divided state to the coating solution, which is prepared in the ordinary way. The articles to be coated, such as small articles, pins, nails, &c., are to be immersed "and moved "about rapidly in the solution in contact with the zinc, or other "metal, until a coating of sufficient thickness is obtained."

[Printed, 3*d.*]

A.D. 1857, June 24.—N° 1769.

MUNTZ, George Henri Marc. — "Improvements in the "manufacture of metals tubes, and axles or shafts."—*Provisional Protection only.* Sheets of metal are to be bent up in the usual way, and a wedge-shaped space is left between the edges to be united, in this a strip or bar of metal is inserted and welded, by rolling or otherwise, to the bent sheet, so as to form a tube.

In making tubes of large diameter, a lap joint is used, and the

joint is heated by bringing it opposite a longitudinal opening made in the side of a suitable furnace, so as to heat the tube in the required part.

[Printed, 3*d.*]

A.D. 1857, July 8.—N° 1897.

GIBBS, JOSEPH. — "Improvements in extracting gold and " silver from their matrices," &c. The gold and silver ores are crushed and "concentrated by washing; the ores or sands are " then ground with quicksilver, with which nitre is mixed.

Suitable self-acting washing machines and crushing apparatus, in which balls are used, are described with drawings.

[Printed, 11*d.*]

A.D. 1857, July 8.—N° 1900.

BAHN, LOUIS ALBERT.—" Improvements in the manufacture " and application of certain metallic alloys."—*Provisional Protection only.* Metallic alloys, composed of copper, tin, and spelter, are proposed to be employed in the manufacture of ship's sheathing, boiler plates, tubes, &c. The articles so made from these alloys are to be afterwards galvanised.

[Printed, 3*d.*]

A.D. 1857, July 8.—N° 1901.

BAHN, LOUIS ALBERT.—" Improvements in galvanizing metals, " and in the apparatus employed therein."—*Provisional Protection only.* Instead of using sal ammoniac as a protecting stratum for the bath used in the galvanizing process, resinous or fatty matters are to be employed. The formation of dross is thereby prevented. The vessel in which the bath is contained may be so constructed that the articles to be coated are introduced from the side, or below, under the surface of the bath.

[Printed, 3*d.*]

A.D. 1857, July 9.—N° 1906.

SWAN, JOHN HOLLEY.—" Improved machinery and steam " engine for crushing quartz and other hard substances, and for

" amalgamating." The quartz or other ores are crushed by passing them between two or more pairs of rollers, " acting in " concert for crushing, the clothing of these rollers being separate " rods or bars of steel, iron, or other suitable metal," so that the faces may be easily renewed. The rods, as shown in the drawings, are arranged round the periphery of the roller parallel to its axis.

A portable steam engine is described.

[Printed, 1*s*.]

A.D. 1857, July 9.—N° 1914.

LEWIS, THOMAS, PARISH, HENRY, and ROBERTS, ROBERT MARTIN.—" Improvements in the separation and extraction of " copper from its ores." The copper ores are broken small and calcined in a kiln or furnace. The calcined ores, while in a heated state, are crushed, and immediately afterwards are plunged into a tank containing sulphuric or muriatic acid or both. The tank may be made of lead or slate, surrounded with a casing containing water, which is heated to the boiling point. When the acid solution has taken up all the copper it is drawn off, the residuum is dried and smelted. The copper contained in the solution is precipitated by introducing iron. The solution may be renewed with acid, and be again used.

[Printed, 4*d*.]

A.D. 1857, July 11.—N° 1931.

PRIMARD, EDOUARD.—" Improvements in treating auriferous, " argentiferous, or other metallic ores." The ores are calcined, and while hot are steeped in or sprinkled with water, which causes them to split; they are then easily ground to powder. The powdered ores are placed on perforated screens in closed vessels, and are treated with currents of chlorine gas. The metals are thereby converted into chlorides; they are then dissolved, and the metals are recovered by the ordinary processes of precipitation.

[Printed, 10*d*.]

A.D. 1857, July 13.—N° 1947.

NEWTON, WILLIAM EDWARD.—" Improvements in the manu- " *facture or reduction* of platinum."—(*A communication from*

Jules Henry Delray, of Paris.) Platinum, when alloyed with different metals found in its ores, acquires improved qualities. The ores are raised to such a temperature that the mixed metals contained are extracted in a state of fusion. To effect this, "the " platinum ore is mixed in a state of division with lime, baryta, " strontia, magnesia, or the carbonates of these bases." The mixture is roasted in the open air to drive off the osmium contained therein. They are then melted in vessels lined with lime, or the other substances or carbonates above mentioned, with combustible gas and oxygen in a suitable furnace. The osmides resulting from the ordinary treatment of platinum are melted, as above described, or with zinc; the osmium is driven off, and the resulting mixture of metals is fused with platinum.

[Printed, 3*d*.]

A.D. 1857, July 20.—N° 2006.

CONWAY, Joseph.—" Improvements in the production of " copper rollers for printing calico and other fabrics." The rollers are made from hollow copper cylinders instead of being made solid, and bored and turned; a mandril is inserted in the hollow copper cylinder so that its ends may project and be supported in suitable adjustable bearings; the cylinder is rolled with the mandril inside it.

The process of rolling is repeated or as often as required, and the cylinder turned and finished in the ordinary way.

[Printed, 3*d*.]

A.D. 1857, July 30.—N° 2074.

COULSON, Samuel.—" Improvements in preparing solutions " for coating with aluminium."—*Provisional Protection only.* The solution for coating with aluminium is to be prepared by introducing into a solution of cyanide of potassium, " a plate or " anode of aluminium attached to the positive pole of a battery." A plate of copper or other suitable metal is attached to the negative pole, " the solution of such latter pole being separated " by a diaphragm." The aluminium will be thereby dissolved, and may be deposited in the ordinary way.

[Printed, 3*d*.]

A.D. 1857, August 10.—N° 2144.

GODEFROY, PETER AUGUSTIN.—"An improved method of " desulphurizing mineral matrix for the extraction of auriferous, " argentiferous, and other metals contained therein." "The " matrix, rock quartz, pyrites, &c., is first ground up or pul- " verized as fine as the finest wheaten flour," it is then subjected in closed vessels, under pressure of steam, to the action of powerful alkalies, as caustic soda or potash, or muriate of soda with caustic lime, together or separate. This operation "decomposes " the matrix and causes the separation and absorption in a large " measure of the sulphurous portion thereof, leaving the metallic " residue in a granulated state to be afterwards consolidated by " known ordinary means."

[Printed, 3*d.*]

A.D. 1857, August 19.—N° 2197.

WALL, ARTHUR.—"Improvements in amalgamating metals." An alloy which will resist the action of the air, or sulphurous or acid gases, or sea water, is thus formed. Copper is melted in a crucible with suitable fluxes, then lead and zinc are melted in another crucible, and bismuth and mercury are mixed therewith. The mixture is added to the copper; the surface of the molten metal should be protected by a layer of sawdust or charcoal.

The proportions recommended for rolling for sheets, or for axle boxes or bearers, are lead 87, zinc 9, copper 2½, mercury 1, bismuth ½, total 100 parts.

Sheathing for ships may be made by using sheets of zinc, copper, or lead, &c., by applying, by means of galvanic action, as described, "any of the oxides of any of the three metals" to the surface of the sheet to be operated upon, or any two of the metals, or all together may be applied, and the sheet is finally plunged in a mercury bath, so that the last covering be mercury.

[Printed, 4*d.*]

A.D. 1857, August 19.—N° 2198.

WALL, ARTHUR.—" Improvements in coating metallic surfaces." A protecting coating suitable for being applied to surfaces im-

mersed in sea water is formed by mixing oxide of lead and turpentine, and making them into a paste; an equal weight of resin is added thereto, and "strong wood naptha." Oxide of mercury may be combined with resin, and be mixed with charcoal.

A solution of sulphate of copper, or lead or zinc, acidulated with sulphuric acid, and mixed with chalk may be used.

[Printed, 4*d*.

A.D. 1857, August 24.—N° 2240.

FOX, SAMUEL, and SLATER, JULIAN WILFRED.—"An im-"proved metallic compound applicable to the manufacture of "various useful articles."—*Provisional Protection only*. It was proposed to alloy fine or foreign zinc in large proportions, as from 10 to 18 per cent., with the metals or alloys with which zinc is usually alloyed. The zinc should be first melted at as low a temperature as possible, and the other metals or alloys are to be added subsequently.

[Printed, 3*d*.]

A.D. 1857, September 4.—N° 2313.

PETITJEAN, TONY. — "An improved method of obtaining "aluminium and magnesium." "Alumina, or magnesia, or other "suitable matter, is placed in a closed tube or chamber, and heated "to a red heat, and sulphuret of carbon, in the form of vapour, is "then passed into, or through it." The mass is stirred from time to time, and "the alumina or magnesia is converted into a liquid "or melted sulphuret." Or a "double sulphuret" is formed by melting the alumina or magnesia in a crucible lined with carbon, mixed with tar or turpentine, together with carbonate of soda, or potash and sulphur; great heat is applied.

The sulphuret, or double sulphuret, so obtained is ground, and put into a crucible, through the bottom of which currents of carburetted hydrogen, or some solid or liquid hydro-carbon, are introduced, which "separate aluminium or magnesium from combina-"tion with sulphur."

[Printed, 3*d*.]

A.D. 1857, September 7.—N° 2330.

WALKER, ANDREW, and WALKER, THOMAS.—"Improve-"ments in the treatment or preparation of moulds for casting

"metals."—*Provisional Protection only.* Pulverised anthracite or other antibituminous coal is to be applied as a powder or dust to the surfaces of moulds.

The same materials may be used as a wash for moulds, and be mixed with sand "as in the case of common coal dust."

[Printed, 3*d.*]

A.D. 1857, September 16.—N° 2397.

WICKS, RICHARD.—"Improvements in furnaces." These consist first in adapting a sliding fire bridge to the fire place. Secondly, in using hollow fire bars having "vertical holes "through one end of each bar," in connection with an additional ash pit, which may be closed by means of a door. When the door is opened cold air is admitted into the furnace through the hollow bars.

[Printed, 7*d.*]

A.D. 1857, September 30.—N° 2517.

HENDERSON, WILLIAM.—"Improvements in treating certain "ores and alloys, and in obtaining products therefrom, and in "recovering or reproducing all or part of the materials used." These relate, 1st, to a mode of treating copper and other metals "in the state of oxides, carbonates, arseniates, phosphates, and "other insoluble salts, or mixtures of these oxides or salts in ores "containing a larger proportion of silica," as upwards of 40 per cent. The ores are crushed and treated in vats with acid solutions, and precipitated as described, and the results are washed, dried, and smelted.

Secondly, ores of copper and other metals in a state of sulphuret combined with iron, and upwards of 30 per cent. of silica, are crushed, calcined, and treated with acid solution as described. Alloys of copper and tin, called "white metal," obtained as a bye product in smelting certain copper ores, are operated upon as described, by crushing them, calcining, treating them with acid solutions, and precipitating. Full directions are given for employing muriatic acid, chloride, and other solutions, and for recovering the waste chloride solutions, and other waste products.

[Printed, 5*d.*]

A.D. 1857, October 8.—N° 2581.

COCKER, James.—"Improved apparatus for heating or an-"nealing wire," &c.—*Provisional Protection only.* A metal cylinder which is heated externally is provided with a horizontal shaft or axis. The wire, or bars of metal to be annealed are placed in coils on the central shaft, inside the heating cylinder, and are there heated. Motion may be given to the coils of metal, by causing the central shaft to rotate on its bearings, which are adjustable.

[Printed, 3*d.*]

A.D. 1857, October 13.—N° 2621.

SHARMAN, William.—"An improved metallic compound "applicable to the manufacture of various useful and ornamental "articles."—*Provisional Protection only.* The invention is stated to consist in mixing fine or foreign zinc with lead and tin in unusually large proportions, as 10 to 18 per cent. zinc, 10 to 18 per cent. lead, 60 to 80 per cent. of tin. The zinc is first melted at a low temperature, the tin is then added in small quantities, and subsequently the lead. For making a solder for this alloy, one part bismuth, two parts lead, two parts tin may be used.

[Printed, 3*d.*]

A.D. 1857, October 19.—N° 2677.

PARTRIDGE, David.—"Improvements in shaft-bearings." A coating of tin or other suitable soft metal is applied to the bearing parts of shafts, especially those intended to work in water, as screw shafts. The surfaces are well cleansed, and pickled, and tinned in the usual way, and a coating of tin of the required thickness is then applied by casting in a suitable mould.

[Printed, 6*d.*]

A.D. 1857, November 5.—N° 2813.

SHARMAN, William.—"An improved metallic compound "applicable to the manufacture of useful and ornamental articles "for which German silver and compounds resembling German "silver are at present used."—Provisional Protection only was

obtained. The metallic compound is proposed to be formed by mixing 35 to 90 per cent. of finest foreign zinc, with from 10 to 65 per cent. of fine tin. The zinc is first melted and the tin gradually added.

[Printed, 3*d.*]

A.D. 1857, November 10.—N° 2840.

PARKES, Alexander.—"Improvements in the manufacture of "tubes and cylinders of copper and alloys of copper." When ingots or masses of copper, or its alloys, cast hollow, are used, they are cast in "open moulds, so that the metal when poured into the "mould is uncovered on its upper surface." Suitable rectangular moulds with ledges or projections for supporting a core are described.

If ingots or masses, cast solid, are used, a hole is drilled through them and a saw cut made in them. The hollow ingots are rolled out, extended, or opened in the ordinary way.

Reducing alkaline fluxes are used in melting the copper and its alloys preparatory to their being cast into ingots.

Cyanide or ferrocyanide of potassium, muriate of ammonia, or carbonates of the alkalies with charcoal are recommended.

Silver solder is used for making cylinders of sheet copper for printers. Ingots cast solid may be made hollow by punching out the centre part when the metal is heated.

For drawing tubes or cylinders, dies or plates, with an inclined screw thread on the interior, are used, and the die or plate is caused to revolve.

[Printed, 4*d.*]

A.D. 1857, November 16.—N° 2876.

RICHARDSON, Thomas.—"An improvement in treating man-"ganese ores." "Black wad and similar ores of manganese" are reduced into small blocks and subjected to the action of regulated heat, about 300° F., so as to expel the water they contain. The heat must never approach "a dull red heat."

Drying kilns or other suitable furnaces may be employed for heating the ores.

[Printed, 3*d.*]

A.D. 1857, November 19.—N° 2902.

KELK, THEOPHILUS HENRY HASTINGS.—" Improved metallic " alloys.—*Provisional Protection only.* Alloys are formed by combining—

Steel, 1 to 15 ounces,
Nickel, ¼ to 12 „
Tin, ½ to 12 „
Copper ½ to 15 „

The properties of the alloy vary according to the respective proportions employed. The process of mixing is performed in the usual way.

[Printed, 3*d.*]

A.D. 1857, December 2.—N° 2996.

PARKES, ALEXANDER, and PARKES, HENRY.—" Improve- " ments in the manufacture of sheathing metals." Copper and its alloys with zinc are combined with phosphorous or with metal manganese to enable the sheets to be rolled hot.

The quantity of phosphorous used must be less than that stated in the specification of Letters Patent dated November 11, 1848 (see N° 12,325, p. 163). The following proportions may be used with advantage—

Phosphorus 6 ounces, pure copper 1,600 ounces (100 lbs.); or, phosphorous 4 ounces, copper 960 oz. (60 lbs.); zinc 640 oz. (40 lbs.), the metals being alloyed; or, manganese 4 to 6 oz., copper 1,600 oz.; the manganese is melted with the copper with carbonaceous matter.

Mercury may be mixed with copper, and the alloy in the proportions given above for phosphorus.

[Printed, 4*d.*]

A.D. 1857, December 15.—N° 3085.

EVERITT, GEORGE ALLEN.—" Improvements in the manufac- " ture of tubes or cylinders of copper or alloys of copper." The metal is cast in suitable closed moulds, pressure is applied by hydraulic apparatus to the outside of the mould so as close it and press the metallic particles. Alloys are formed by combining 8 parts of copper and 1 part of good yellow brass; they are

suitable for tubes and printing rollers, and may be used instead of pure copper. Prior to the first drawing of the tubes and to every subsequent drawing, except the last, the tubes are pickled by immersing them in a solution of soft soap and water. The solution is also applied to the tubes externally while they are being drawn.

[Printed, 3*d.*]

A.D. 1857, December 18.—N° 3114.

OXLAND, Robert.—" Improvements in the manufacture of " alloys or compounds containing metallic tungsten."—(*A communication.*) An alloy called " wolfram metal" is made by exposing wolfram ore or mineral to the strong heat of an air or other suitable furnace for about three hours or longer; by preference, the ore is placed in crucibles lined with charcoal. The ores should be previously crushed, washed, and, if necessary, calcined or otherwise purified; the mass is finally digested in dilute muriatic acid, so as to remove all arsenic and sulphur. The product is a porous mass of a greyish colour, and consists of metallic tungsten in combination with carburets of iron and manganese. The wolfram metal may be mixed with iron in the blast furnace, or melted with pig iron in a cupola. About 30 per cent. of the metal may be so mixed with iron.

The alloy of cast iron with tungsten may be used for metallurgical purposes, and for making blue oxide of tungsten and tungstic acid.

The wolfram metal is used for making metallic tungsten and wolframium; it is granulated and digested in muriatic acid, out of contact with air, a black powder is deposited, this is collected on a filter, washed, and dried in currents of hydrogen gas. By triturating the powder in a mortar with water, a blue colour obtained; by digesting it in nitric acid " tungstic acid of a beautiful yellow colour is produced; by calcination with carbonate of soda, tungstate of soda is made.

Good cast steel is obtained by melting ½ to 25 per cent. of wolfram metal with the steel.

Ordinary pots and furnaces may be used, but from 10 to 20 minutes before the metal is poured it should be kept at a bright white heat.

Alloys of iron and wolfram metal may be refined and made into cast steel by cementation in the ordinary way.

Refined wolfram cast iron has its crystallization destroyed by being hammered cold.

Pure metallic wolframium, or tungsten, obtained by reducing tungstic acid previously alloyed with nickel, may be used in making German silver or packfong; the ductility is not affected, specific gravity is increased. 2 parts of tungsten and 3 parts of nickel may be fused in crucibles."

[Printed, 3*d.*]

A.D. 1857, December 19.—N° 3115.

NEWEY, THOMAS, CORBETT, JOHN, and PARKES, WILLIAM HENRY.—"A new or improved method of treating or coating 'steel pens and penholders" and other surfaces, &c.—*Provisional Protection only.* About 2 lbs. of bitartrate of potash are dissolved in 5 gallons of water, heated to about 180° F. A plate of tin is to be suspended in the solution, and the steel pens or other small metallic articles are suspended therein, all in connection with a suitable battery, and are coated with tin by the electro process.

rinted, 3*d.*]

A.D. 1857, December 28.—N° 3174.

DESMOUTIS, HENRY.—" New metallic alloys."—Alloys made of rhodium, oridium, or ruthenium and platinum, may be used for chemical and philosophical apparatus, and goldsmiths' and dentists' work. The metals are purified, pulverized, and then combined with pulverized platinum by the ordinary processes, and solidified by heat; the proportions of the metals must be varied according to the purposes for which they are to be applied.

[Printed, 3*d.*]

A.D. 1857, December 29.—N° 3181.

PARKES, ALEXANDER.—" Improvements in joining or uniting metals." Solders formed of zinc in strips, or zinc and mercury in a granulated state, are used with suitable fluxes for uniting metals. One part by weight of mercury with 20 parts of zinc may be used.

[Printed, 3*d.*]

1858.

A.D. 1858, January 1.—N° 5.

PARKES, ALEXANDER, and PARKES, HENRY.—"Improve-
" ments in the manufacture of rods, wire nails, and tubes," of copper and its alloys. Copper and its alloys compounded with zinc may be combined with phosphorus or metal manganese, in such proportions that the metal may be "rolled and worked hot " or cold into rods, wires, nails, tubes, &c."

About 8 *oz.* or less of phosphorus or metal manganese may be used with each 100 lbs. of the compound.

[Printed, 3*d*.]

A.D. 1858, January 1.—N° 6.

CLARE, JOHN WILLIAM.—"Improvements in steam engines " and boilers, part of which improvements is applicable to " furnaces." Improvements relating to steam engines, locomotives, furnaces, and boilers are described.

"In certain cases, cylinders of smelted metal rolled round a " mandril or core to the desired dimensions," are used.

[Printed, 10*d*.]

A.D. 1858, January 2.—N° 9.

SLATE, ARCHIBALD.—"Improvements in apparatus for sup-
" plying fuel to blast furnaces." Pulverised fuel is introduced into the furnace "by blast at the twyeres, by means of apparatus " capable of measuring the quantities delivered into the blast " pipes."

The pulverised fuel is fed from hoppers into pipes, which are provided with slides or valves. These are opened and shut by apparatus connected with the blowing engine. The supply is thus alternately opened and cut off, and regulated as required.

[Printed, 5*d*.]

A.D. 1858, January 5.—N° 14.

ELLIS, JAMES, and ELLIS, JOSEPH HENRY.—"Improvements " in machinery for subdividing or reducing into small particles,

"masses of rock, and minerals." Crushing apparatus for breaking up rock, road metal, or concrete, is described. Suitable rollers or discs with "corrugated or denticulated" surfaces are used in connexion with suitable bed plates, which may also have corrugated surfaces.

[Printed, 1*s.* 4*d.*]

A.D. 1858, January 6.—N° 22.

MALCOLM, JAMES DRYSDALE.—"Improvements in apparatus "for ornamenting fabrics and other surfaces." Modes of applying various substances, as bronze powders, to the surfaces of fabrics, are described.

The powders or other substances are placed in cells of the requisite depth, and divided by their partitions, arranged so as to form the required pattern on the surface of the fabric or paper, which is rendered adhesive. Pressure is then applied by suitable apparatus.

[Printed, 4*d.*]

A.D. 1858, January 9.—N° 40.

ROWELL, THOMAS. — "Improvements in furnaces." The specification and drawings describe a furnace, which may be used for heating boilers and other purposes, in which two slides are "constructed of hollow castings of iron, which are connected "at their front ends with a hollow dead plate, the under surface "of which has an opening into it for the passage of air."

The castings are connected with a hollow chamber, in the bridge of the furnace.

Suitable doors and valves are described for regulating the supply of air.

[Printed, 1*s.* 4*d.*]

A.D. 1850, January 11.—N° 45.

TAYLOR, ISAAC.—"Improvements in manufacturing metallic "cylinders used in printing calico," &c. Sheets or plates of copper or other metals are bent, and the two abutting edges are held together by solder or otherwise, while strong pressure is

applied to the seam, by suitable apparatus acting upon it, both externally and internally with great force.

Apparatus for engraving or stamping patterns on the cylinders is also described.

[Printed, 4*d.*]

A.D. 1858, January 14.—N° 63.

STENSON, JOSEPH.—" Improvements in the manufacture of " wrought iron." The specification and drawings describe modes of making " forge bars with grooves, and forming therewith a " box pile," which is heated and rolled in the usual way. To prevent the sides of the box pile from falling outwards, the forge bars and scrap iron mixed therewith are placed in a frame or case.

In making " angle iron," forged bars formed into an angular shape, are made into a pile and rolled.

[Printed, 9*d.*]

A.D. 1858, January 18.—N° 80.

BROOMAN, RICHARD ARCHIBALD.—" Improvements in ma- " chinery for the manufacture of pipes and tubes."—(*A communication.*) Machinery for rolling tubes of copper or other metals is described with drawings. The tube is formed out of " an " ingot or casting of the intended metal, by rolling it or forming " it upon a stationary mandrel, the metal being stripped from " the end of the mandrel by the action of the rollers as it passes " between them."

Several sets of rolls may be used.

[Printed, 7*d.*]

A.D. 1858, January 19.—N° 82.

WALKER, ANDREW, and WALKER, THOMAS.—" Improve- " ments in the treatment or preparation of moulds for casting " metals." Pulverised anthracite or " blind or stone coal or other " antibituminous coal," is dusted upon the surfaces of the moulds.

The pulverised anthracite may be applied in form of a wash, by mixing it with water to the consistency of cream.

[Printed, 3*d.*]

A.D. 1858, January 19.—N° 93.

CORVIN, OTTO VON.—"Improvements in the mode of inlaying "or ornamenting in metals and other materials." Modes of inlaying metals or alloys "by means of galvanoplasty" are described; or the metal is used in a molten state, and is compressed into interstices formed by stamping or engraving in the surface, which is proposed to be inlaid.

[Printed, 4d.]

A.D. 1858, January 21.—N° 106.

WHITE, WILLIAM.—"Improvements in machinery or apparatus "for making moulds or matrices employed in casting metals." The specification and drawings describe apparatus for ramming sand or other material round the patterns used for preparing casting moulds. Suitable framing or standards are used for carrying an overhead shaft, which is provided with driving gear, and by means of eccentrics, cranks, or cams, gives a vertical ramming or stamping motion to the "packing rams." The mould boxes are supported on travelling tables.

[Printed, 10d.]

A.D. 1858, January 21.—N° 111.

RAWLINS, EDWARD, and BRIDEN, JOHN.—"A new or im-"proved method of working stamps used for stamping," &c.—*Provisional Protection only*. Apparatus for actuating rams or stampers is described in the provisional specification.

The band which actuates the stamper passes over a pulley. In the periphery of the pulley are recesses, in which work rollers The rollers stand out from the periphery of the pulley, but are supported on springs which yield to pressure.

The pulley is driven by steam or other power, and while the band hangs loosely the rollers act as loose pulleys. When pressure is applied to the band by the attendant, the springs and rollers yield, the band is brought into close contact with the surface of the running pulley, which bites, and so moves the stamper.

[Printed, 3d.]

A.D. 1858, January 26.—N° 145.

HEATON, Ralph, and HEATON, George.—"An improvement or improvements in annealing metals." —*Provisional Protection only*. In the ordinary process of annealing metals oxidation takes place. This is to be prevented or diminished by placing the vessel containing the heated article in a second vessel on a raised stand. The bottom of the vessel is covered with water, oil, or other suitable liquid. A third vessel is then inverted over the annealing vessel, so that a water joint is formed, and the annealing vessel is acted upon only by the small quantity of oxygen contained in the air in the inverted vessel during the process of cooling.

[Printed, 3*d*.]

A.D. 1858, January 27.—N° 146.

MOTTRAM, Thomas, EDWARDS, John, and MITCHELL, Joseph.—"Rolling steel, iron, and other metals," &c.—*Provisional Protection only*. It is proposed to use rollers so cut, fluted, or beveled as to form the metal rolled of the shape required for the articles to be made, as knives, razors, bayonets, &c. The rolled metal is to be cut in suitable lengths.

[Printed, 3*d*.]

A.D. 1858, January 28.—N° 156.

JOHNSON, John Henry.—"Improvements in the manufacture of metal pipes, and in the apparatus employed therein."—(*A communication*.) Pipes and tubes are made of lead or other soft metal by the aid of a press, which forces the metal continuously through a die in the ordinary way.

Apparatus is described for coating the pipe with tin internally, or externally and internally together, during the process of manufacture.

A bath of tin for tinning pipes or tubes externally may be combined with the ordinary drawing apparatus, as described.

[Printed, 10*d*.]

A.D. 1858, January 30.—N° 174.

BOUCK, John Augustus.—"Improvements in the manufacture of sulphate of copper," &c.— Provisional Protection only.

Pyrites or other native sulphuret is to be used "for affording the "base."

Sulphur is driven off by heat. The residue salt is treated with muriatic acid, and "subsequently sulphuric is added, the former "being driven off by heat.

"A second quantity of sulphur will be liberated by the muriatic "acid," which is to be collected, and "metallic copper or salts of "c pper may be obtained by any usual means."

[Printed, 3*d.*]

A.D. 1858, February 8.—N° 234.

NEWTON, WILLIAM EDWARD.—"Improved machinery or "apparatus for breaking stones, minerals, and other analogous "substances."—(*A communication.*) The specification and drawings describe crushing apparatus "which is provided with a "suitable spring, acting in such a manner on the crushing "hammer as to allow of working the said hammer by means of a rotary motion obtained from any suitable prime mover.

A continuous feeding apparatus is also described.

[Printed, 7*d.*]

A.D. 1858, February 11.—N° 260.

BURTON, GEORGE W.—"An improved method of manufac-"turing white lead."—(*A communication.*) Lead is subjected to the action of steam and atmospheric air, for the purpose of oxydation, then to the vapour of acetic acid to form the sub-acetate, and afterwards to the action of carbonic acid, alternately and successively, until the operation is completed.

[Printed, 7*d.*]

A.D. 1858, February 19.—N° 317.

SEYERS, JOHN MILNE.—"Improvements in the decomposition "of salt, and in the abstracting of metals from their ores."—*Provisional Protection.* The ores containing metals are to be placed in a vessel containing water. Wires composed of the various metals contained in the ores are at one end immersed in the water, and at the other are immersed in a vessel containing

chloride of sodium and water. "This being done galvanic action " takes place, and the metals in the ores are conveyed into the " vessels containing chloride of sodium and water." Thus, it is stated "silver wire will convey silver, copper wire will convey " copper, and so on."

[Printed, 3*d.*]

A.D. 1858, February 20.—N° 334.

GREENE, William and GREENE, Matthew Charles.— " Improvements in joining soft metal pipes." — *Provisional Protection only.* Instead of soldering pipes made of lead, tin, or soft metal, a flange is to be formed on the ends of each pipe and " part of a screw, coupling one male and the other female," is placed on each. The two flanges are thereby bound together.

[Printed, 3*d.*]

A.D. 1858, February 22.—N° 345.

BROOMAN, Richard Archibald. —"An improvement in " treating ores of precious metals."—*Provisional Protection only.* Ores containing the precious metals, as auropyritous ores or " tailings," containing but little gold, are ground in the usual way, and treated with pyroligneous, acetic, or other vegetable acid. With every bushel of pulverised ores may be mixed about a gallon of acid in a suitable caldron. The temperature may be raised to the boiling point to hasten the process, and be so continued for from four to six hours. The acid is then evaporated, and the ores are amalgamated with quicksilver. The use of the vegetable acid is said to effect great saving in the quicksilver employed in the amalgamating process.

[Printed, 3*d.*]

A.D. 1858, February 22.—N° 346.

BROOMAN, Richard Archibald.—" Improvements in machinery for effecting the amalgamation of precious metals."—(*A communication.*)—*Provisional Protection only.* Amalgamating apparatus is described in the provisional specification. It may be used with ores treated in the old way, or with vegstable acids, as above described (see No. 345.)

A tub having its sides of wood or metal is used. The bottom is to be made of durable material, and be made moveable, so that it may be replaced when it is worn out.

A "revolving muller" is used for agitating and thoroughly mixing the pulverised ores and the quicksilver."

[Printed, 3*d.*]

A.D. 1858, February 23.—N° 352.

BROOMAN, RICHARD ARCHIBALD.—"Improvements in apparatus for separating substances of different specific gravities."—(*A communication from P. Imbert.*)—*Provisional Protection only.* It is proposed to use a revolving conical drum, pierced with holes, for washing ores. The large end of the drum revolves partly in a trough of water, and the centrifugal action of the particles as the drum revolves is to be made to separate the heavier from the lighter substances.

[Printed, 3*d.*]

A.D. 1858, February 23.—N° 353.

SHEPARD, EDWARD CLARENCE.—"An improvement or improvements in depositing metals and metallic alloys by electricity."—*Provisional Protection only.* An alloy of nickel and silver is deposited by using an anode or plate of silver, alloyed with nickel; silver is dissolved in nitric acid, and the residue, after evaporation, is dissolved in pure water.

A solution of carbonate of ammonia is to be put into the silver solution "until it is clear."

The metal is dissolved in nitric acid; carbonate of potash or common potash may be added. The precipitate sent down is collected and washed, and put into a solution of carbonate of ammonia "until it becomes a clear solution."

The solutions of silver and nickel are mixed in a vessel (1 part of silver to 2 of nickel solution), and a plate of 1 part silver and 2 parts nickel is used as an anode.

3 or 4 oz. of cyanide of potassium may be added to the solution to make it work rapidly.

To give iron, zinc, or other metals an appearance of bronze or brass, 7 parts of cyanide of potassium, 3 of sulphate of copper, and 1 part of sulphate of zinc are dissolved each in pure water in a separate vessel.

Portions of the copper and zinc solutions are mixed each in a separate vessel with the potassium solution "until it becomes a "clear solution."

The resulting solutions are mixed, and about 2 oz. of caustic potash and 4 oz. of cream of tartar are added.

To make a red brass deposit the solution is used with a copper anode; to make a green colour a brass anode may be used.

[Printed, 3d.]

A.D. 1858, February 24.—N° 360.

BORLASE, Edward.—"Improved apparatus for separating "metals and metallic ores from other mineral substances." The specification and drawings describe apparatus for washing crushed ores. The ores are placed in a reservoir or vessel made in the shape of an inverted cone. A similar inverted cone is also placed inside it. Water is forced into the bottom of the outer vessel and up through the ores. The lighter particles are driven over the edge of the inner vessel, and are afterwards washed again in a separate vessel. The residue is subsequently conveyed to a series of sieves, and is washed by water forced through the particles by the action of a piston and plunger.

[Printed, 10d.]

A.D. 1858, February 24.—N° 369.

BROWNING, Henry.—"An improved composition for cover- "ing iron and other ships' bottoms, and other surfaces."—*Provisional Protection only.* Iron or other ships' bottoms are proposed to be coated with a composition consisting of "verdigrease ground "in turpentine, thinned with Damma varnish, white copal, or "what is called paper varnish."

[Printed, 3d.]

A.D. 1858, February 27.—N° 390.

NURSE, David, NURSE, Robert, and NURSE, George. —"Improvements in coating metals, and in the apparatus con-

"nected therewith." In coating iron or other metals with tin or an alloy of tin and lead, a suitable heating chamber is substituted for the grease or grease pots usually employed in finishing the plates. The plates are put in a heated cellular chamber (formed by making partitions in a cast-iron box), and the superfluous metal is melted and runs off. Grease may be used in the preparatory process, or the uncoated plates are dipped in a solution of chloride of zinc to produce terne plates, and a solution of chloride of tin to produce tin plates. The plates are dipped in two baths, one called the "tin pot," the other the "wash pot." About two thirds lead and one third tin may be used in making the terne plates finished in the way described.

[Printed, 5*d.*]

A.D. 1858, March 2.—N° 409.

BROOMAN, Richard Archibald.—"An apparatus for separating substances of different specific gravities, and for washing "sands and earths."—(*A communication from Alphonse Prestel.*)—*Provisional Protection only.* The sands or ores are to be washed in a pan having a bottom narrower than its top, and placed in a vessel made in the shape of an inverted cone. Water is admitted, and revolving blades are used to agitate the water and earth in the pan, in the bottom of which is a central aperture closed by a plug. The water being set in motion by the revolving blades the heavier particles are deposited round the central plug, and when that is raised fall through into the receiver below.

[Printed, 3*d.*]

A.D. 1858, March 6.—N° 461.

JOHNSON, John Henry.—"Improvements in the production "of aluminium and its alloys, and in the production of other "metals, the oxides of which are not reducible by charcoal."—(*A communication from L. P. B. E. Aumenge, of Paris*). The invention is stated to consist of two heads. The first relates to obtaining aluminium from the sulphuret of that metal by heating it with anhydrous sulphate of alumina, or with anhydrous alumina in a non-oxydising atmosphere.

The second head relates to obtaining aluminium from its sulphuret by passing a dry current of hydrogen through or into it when heated to a red heat while the air is excluded.

[Printed, 4*d.*]

A.D. 1858, March 6.—N° 462.

SAUNDERSON, Charles.—" Improvements in the manufac-" ture of malleable iron and steel."—*Provisional Protection only.* In making malleable iron directly from the puddling furnace it is proposed to use the process of refining iron (by adding thereto a suitable chemical re-agent, as sulphate of iron), described in the specification of former Letters Patent, dated November 24, 1855, N° 2653. See " Abridgments of Specifications relating to the " Manufacture of Iron and Steel," page 209.

Crude pig iron is melted in the puddling furnace, or run into it from the blast furnace. The sulphate of iron or other suitable chemical re-agent is to be added to it, and the iron is then puddled in the usual way.

[Printed, 3*d.*]

A.D. 1858, March 8.—N° 471.

BUDD, James Palmer.—" Improvements in the smelting or " refining of tin, tin ores, and tin scruff." The smelting operation is carried on in closed vessels, from which air is excluded. Carbonaceous matters are mixed with the tin, or ores, or scruff, and heat is applied. Pure tin first separates from the matters with which it may be mixed, and a higher temperature may then be applied to melt the more refractory materials.

Instead of using carbonaceous matters, the oxides may be prepared by calcining them with suitable fluxes in separate vessels. The process may be used for separating tin from tin scrap.

[Printed, 3*d.*]

A.D. 1858, March 11.—N° 494.

LEATHART, John Dickinson.—" Improvements in furnaces." —*Provisional Protection only.* It is proposed to apply "to the " back end of the furnace in front of the bridge and below the

" arch " a small frame of fire bars, of the width of the furnace. The frame is raised and lowered with a lever when fresh fuel is supplied.

Atmospheric air is admitted through openings in the brick-work in front of the small frame.

[Printed, 3*d.*]

A.D. 1858, March 12.—Nº 507.

CORBELLI, Luigi Ferrara.—" An improved process for " extracting aluminium from its compounds, and obtaining at the " same time proto-chloride of mercury."—(*Partly a communication from Vincent Riatti, of Modena.*) Rock alum, 5931 parts, is combined with chloride of calcium, 2076 parts, or with chloride of sodium 2190 parts, or sulphate of alumina, 4167 parts, is combined with chloride of calcium, 2076 parts. The mixture is dried, pulverised, and dissolved in 2½ times its weight of water, then filtered, and placed in a vessel made of non-conducting material, into which fluid mercury is introduced. Weak currents of electricity are passed through the vessel by means of an iron wire, one end of which is dipped in the mercury, the other connected with the positive pole of a battery. A plate of zinc is suspended in the solution not in contact with the mercury, and is connected with the negative pole of the battery. The galvanic action decomposes the salts of alumina, and aluminium in the form of black powder, or a thin compact sheet, is deposited on the zinc plate. Chlorine is set at liberty, and combining with the mercury, forms proto-chloride of mercury, or calomel, which is deposited on the surface of the mercury.

[Printed, 3*d.*]

A.D. 1858, March 13.—Nº 510.

TILLIERE, Christophe.—" Certain improvements in ma- " chinery for forging, planing, and stamping cold or heated " metals."—*Provisional Protection only.* It is proposed to attach the hammer or stamper to a slide working in vertical standards. It is raised by means " of a single or double cam, " fixed to a shaft working in suitable bearings." " To the shaft is

" keyed a fly wheel, and fast and loose pullies. The hammer is
" made to descend by the action of a spring of wood or steel."

[Printed, 3d.]

A.D. 1858, March 13.—N° 513.

WALKER, Samuel.—"Improvements in the manufacture of " tubes of copper and alloys of copper." A skelp or sheet of copper or alloy is bent, one end being turned up, and a mandrel placed thereon. The skelp with the mandrel is passed through " a lapping hole or turning-up hole," which is fixed in front of a pair of rolls, which have suitable grooves cut in them.

The end of the skelp is seized by the rolls, and drawn through the lapping hole, the joint being perfected by the action of the rolls.

The pressure of the rolls also bevels the edges of the tube, so as to facilitate the subsequent brazing.

[Printed, 6d.]

A.D. 1858, March 17.—N° 542.

CLARK, William Stettinius.— "Improvements in metallic " canisters for holding gunpowder and articles of a similar " nature."—(*A communication from Messrs. Green, Wilson, and Green, Delaware, U.S.*) Canisters are made of corrugated sheets of metal, joined to a bulged centre part. A screw of Britannia metal is cast on a mandrel in a ring temporarily placed on the head of the canister.

[Printed, 7d.]

A.D. 1858, March 18.—N° 552.

DOLEY, Charles, BIGLAND, Edwin, and WORRALL, Thomas Henry.—"Improvements in ornamenting metals."—*Provisional Protection only*. The patterns required to be produced on metallic surfaces, are, first to be drawn on glass, and then transferred to the metallic surface; or the metallic surface is covered with wax or other protecting coating, and the pattern formed in it by removing portions as required. Suitable acids are used to act upon the exposed metallic surface, and produce the required pattern.

[Printed, 3d.]

A.D. 1858, March 18.—N° 553.

WEBSTER, James. — "Certain new or improved metallic alloys."

Alloy No. 1 is composed of	3	parts by weight of nickel.
	6	of copper.
	12	of tin.
	1	of antimony.
Alloy No. 2 is composed of	2	parts by weight of alloy No. 1
	20	of tin.
	½	of antimony.
Alloy No. 3 is composed of	1½	parts by weight of alloy No. 1.
	20	of copper.
	20	of zinc.
Or	1½	parts by weight of alloy No. 1.
	21	of copper.
	15	of zinc.

A melting furnace, suitable for working at high temperatures, is described.

Alloy No. 1 forms a hard white alloy, not liable to tarnish, and suited to specula and reflectors for optical instruments.

Alloy No. 2 may be rolled and annealed, and used for the purposes to which white alloys, as German silver, are applied. When alloyed with lead it may be used like Britannia metal, for making cheap articles.

Alloy No. 3 may be used for bearings of machinery, valves, slides, &c., and being very sonorous, may be employed for bells.

[Printed, 7*d*.]

A.D. 1858, March 18.—N° 560.

NEWTON, Alfred Vincent. — "An improved process of "polishing, blueing, and annealing articles of iron and steel." Sheets and plates, rods and bars of iron and steel are, after being rolled or drawn by the usual process, plunged into an acid, both to cleanse them and remove scale, and are then passed as often as is required between smooth rollers. This process of cold rolling renders the fibres compact, and gives a hard smooth polished appearance to the surface, which resists corrosion. Chilled rollers are used, and they may be made of any shape to give the required form to the rolled article.

Sheets or bars may be coloured to resemble Russia sheet-iron, by dipping them in a bath of zinc, lead, or other suitable metal or alloy.

[Printed, 4*d.*]

A.D. 1858, March 19.—N° 568.

WILLIAMS, George, and HOWLEY, Edward.—"An im-"provement or improvements in piling iron." Grooved bars of iron are arranged as shewn in the drawings attached to the specification, so as to form a box pile.

The bars are so placed that the lamination may be in the direction favourable to the durability of the iron when the pile is rolled.

Modes of piling bars to make angle iron and T iron are also described.

[Printed, 7*d.*]

A.D. 1858, March 19.—N° 571.

EVANS, Daniel.—"An improvement in apparatus for supplying "air in streams to furnaces." Perforated tubes are employed, and each tube is made double in order that there may be a space or compartment for water between the two tubes.

The tubes may be employed for introducing air into furnaces where a very great heat is requisite.

[Printed, 1*s.* 4*d.*]

A.D. 1858, March 19.—N° 572.

MUNTZ, George Frederick.—"Improvements in mixing zinc "with copper and other metals."—*Provisional Protection only.* The copper and other metals are to be removed from the melting furnace, and placed in a closed vessel, and while they are at a high temperature zinc is introduced and mixed therewith. The process is peculiarly applicable for making Muntz's metal, or yellow metal.

[Printed, 3*d.*]

A.D. 1858, March 30.—N° 671.

DURAND, Jean Claude.—"Improvements in the manufacture of iron." In forming the pile for making bar iron for rails,

girders, and other articles, the forge bars are arranged in the positions shown in the drawings. The object is that each bar shall occupy in the finished article the position most favourable to the exercise of its maximum strength when subject to the forces which it is destined to bear.

[Printed, 6*d.*]

A.D. 1858, March 30.—N° 674.

STEVEN, THOMAS, REID, THOMAS, and FREW, THOMAS. —"Improvements in making moulds for casting." The specification and drawings describe apparatus for "ramming up green " sand cores, for pipes and other similar articles, through narrow " or contracted openings in the upper half core boxes." Core bars of great strength are used.

Various modes of ramming for forming moulds for casting various hollow articles are described.

[Printed, 11*d.*]

A.D. 1858, March 30.—N° 677.

NEWTON, WILLIAM EDWARD.—" Improvements in the manu' facture of sheet iron."—(*A communication.*)—*Provisional Protection only.* In order to cover the surface of manufactured iron with a tough scale, which will act as a protecting coat, and prevent the iron from being attacked by rust, it is rolled in its manufacture into sheet iron "in a bath of pulverised iron ores, or " ores of zinc or manganese, or other metals or earthy matters;" these will be partly decomposed by the heated iron, and are caused to react upon it and form the required scale.

The pulverised substances may be brought into contact with the iron in closed vessels, or in annealing boxes, or by other suitable means.

[Printed, 3*d.*]

A.D. 1858, April 6.—N° 729.

OWEN, EDWARD.—" Improvements in the manufacture or pro" duction of artificial fuel, and in the application of the same to " metallurgical purposes."—*Provisional Protection only.* Ordinary peat charcoal is ground to powder, and mixed with coal tar,

pitch, or other bituminous substances. It may then be compressed, and is afterwards recarbonised or coked in closed vessels. It may then be used like charcoal in working metals.

[Printed, 3*d*.]

A.D. 1858, April 7.—N° 745.

ARMITAGE, William, and LEA, Henry.—"Certain im-"provements in the manufacture of iron." Iron is fused in combination with steel. The operation is performed either in the blast furnace, or in the refinery with the pig metal, or in the puddling furnace. An iron is thereby manufactured capable of resisting great tensile strain, and great pressure.

[Printed, 3*d*.]

A.D. 1858, April 10.—N° 775.

BRUN, Pierre.—"The application of an improved blowing fan "to steady or portable forges, with or without reverberatory "furnaces, &c." The specification and drawings describe a fan having two blades or wings. A worm screw is cut on the shaft of fan, and is geared into a grooved wheel turned by a crank. The wings or blades are half hollow.

[Printed, 1*s*. 4*d*.]

A.D. 1858, April 10.—N° 781.

McCRAE, Daniel.— "Improvements in preserving ships' bot-"toms and other exposed surfaces from fouling and injury or "decay." The fibrine grease obtained from the cells of bones by boiling them is used. It may be mixed with sulphate of copper, or other poisonous substance, and is then applied as a protecting coating to ships' bottoms.

[Printed, 4*d*.]

A.D. 1858, April 14.—N° 801.

ARMSTRONG, Robert, and GALLOWAY, John.—"Im-"provements in apparatus and furnaces for heating, welding, or "melting metals, parts of which improvements are applicable to "other furnaces."—*Provisional Protection only*. Reverberatory furnaces are to be provided with chimnies of considerable height.

Suitable openings and channels are made in the arched crown of the furnace to supply air in thin streams.

Self-acting feeding apparatus is used for supplying fuel.

[Printed, 4*d.*]

A.D. 1858, April 14.—N° 803.

HOLMES, WILLIAM CARTWRIGH, and HOLLINSHEAD, WILLIAM.—" Improvements in the manufacture of metal cast-" ings." Metal moulds are employed, then are surrounded with suitable jackets or casings, and heated when requisite, by means of hot water steam, or by preference by superheated steam.

Superheated steam is also used for drying cores and sand moulds in suitable chambers.

[Printed, 1*s.* 7*d.*]

A.D. 1858, April 15.—N° 814.

DAVIES, CHARLES, JONES, WILLIAM, and JONES, JOHN. —" An improved method of finishing tinned terne or lead plates " without the use of grease."—*Provisionnl Protection only.* Hot air is proposed to be employed instead of grease. The plates are to be placed in a suitable stove of brick work, and are finished by exposing them to the action of heated air, instead of immersing them in ordinary grease pots.

[Printed, 3*d.*]

A.D. 1858, April 16.—N° 828.

PRICE, ASTLEY PASTON.—" Improvements in the treatment " of certain zinc ores and compounds of zinc, and in the manufacture of zinc and oxide of zinc." The calcined or oxydised ores of zinc or artificially prepared oxides of zinc, such as those resulting from calcined or oxidised blendes, or substances containing them, are reduced to a finely divided condition, and are intimately mixed with carbonaceous matters, such as bituminous coal, coke, or other bituminous, tarry, or pitchy substances. One part in bulk of the calcined or oxidised ores of zinc or blendes may be mixed with two parts of carbonaceous matters. The mixed substances are subjected to the action of heat in closed distillatory or other suitable apparatus, "for the purpose of ex-" tracting the zinc or oxide of zinc therefrom."

[Printed, 4*d.*]

A.D. 1858, April 16.—N° 829.

PRICE, Astley Paston.—"Improvements in obtaining cad-" mium and certain compounds thereof." Ores containing cadmium, as blendes, or sulphurets of zinc containing sulphurets of cadmium, are calcined in a suitable furnace in contact with air. The sulphuret is "entirely or in part converted into sul-" phate of cadmium, the other metals into sulphates or oxides." The sulphate of cadmium may be "dissolved out by means of " water or otherwise." Cadmium is separated therefrom by means " of metallic zinc;" or sulphuretted hydrogen or other precipitating agents. If the solution contain silver or iron they may be previously precipitated by means of metallic iron. Sulphurets of zinc or blendes are subjected to the "salting process," by calcining them with salt or chloride of sodium, or other suitable chloride. The resulting soluble salt of cadmium is washed out with water, and cadmium is separated therefrom.

The sulphuret of cadmium, obtained as aforesaid, may be dissolved in hydrochloric or nitric acid, and the cadmium is then precipitated by means of zinc, or otherwise.

The sulphuret of cadmium may be calcined and "converted " into oxide, and this being mixed with suitable carbonaceous " matters" is distilled in suitable vessels.

[Printed, 3*d.*]

A.D. 1858, April 16.—N° 830.

PRICE, Astley Paston.—"Improvements in the treatment " and smelting of certain argentiferous or silver ores." Silver ores are pulverised and mixed with suitable carbonaceous matters, as bituminous, tarry, or pitchy substances, and subjected to heat in suitable closed vessels, so as to "form a coke or coked material." The silver ores may be mixed with suitable fluxes, and with or without fluxes, "with sulphurets of copper, iron, or " lead, or other sulphuretted materials," or with "oxides or car-" bonates of lead."

The proportions preferred are one part by bulk of silver ores, with two parts of carbonaceous matters. The mixtures may be reduced in a smelting or other suitable furnace.

[Printed, 3*d.*]

A.D. 1858, April 22.—N° 885.

SMITH, George.—"Improvements in the manufacture of "zinc." The specification and drawings which are very numerous, describe furnaces and distilling apparatus. Retorts for the distillation of zinc are introduced "into the space inter-"vening between reverberatory or air furnaces, and their stacks," whereby "the waste heat is utilized." Cylindrical retorts of fire clay, as used in "Belgium" or "Liége," zinc furnaces are very suitable.

The system is shown in the drawings as applied to the "Silesian" zinc furnace.

[Printed, 2s. 3d.]

A.D. 1858, April 23.—N° 896.

RYDER, William.—"Improvements in preparing moulds and "moulding boxes for casting metal or other materials."—*Provisional Protection only.* Two patterns or sets of patterns are to be used. One portion of each set is sunk in a bed of sand, the pattern being thus prepared "transfers are taken, which are "used as moulds or beds to contain the patterns; a moulding "box is placed over each transfer, and sand is rammed into the "moulding boxes as usual." The boxes are then removed and united.

The pins are attached to flanges, which are bolted to the boxes.

[Printed, 3d.]

A.D. 1858, April 23.—N° 901.

JENKIN, Alfred.—"Improvements in furnaces for the reduc-"tion and calcination of lead, tin, and copper ores." The improvements relate to modifications of furnaces and apparatus described in the specification of prior Letters Patent, dated April 23, 1855. See ante p. 288.

Cast iron or other metallic bottoms are used in the calcining furnaces, and are heated by the waste heat from "an adjoining "flowing furnace," by means of suitable flues. The centre portion of the roof of the calcining and flowing furnace is lowered, to economise fuel.

The vapours of oxide of lead evolved from the flowing furnace, are condensed by passing them over or in contact with a tank of water, on their way to the chimney.

[Printed, 9*d.*]

A.D. 1858, April 24.—N° 905.

MAITRE, JOSEPH.—"Proper apparatus for washing iron "mineral." Crushing apparatus is described. The rougher portions of the ore which require to be crushed are subjected to the action stampers.

The finer portions which do not require to be crushed are sifted or screened off by means of suitable gratings.

[Printed, 7*d.*]

A.D. 1858, April 26.—N° 923.

DOBSON, THOMAS.—"Improvements in machinery or appa- "ratus for forging iron."—*Provisional Protection only.* It is proposed to fix a hammer on a shaft in the rear of two uprigh frames, between which the hammer helve vibrates.

Two horizontal slots are formed in the frame, to allow of slide blocks working in them, carrying the ends of a transverse shaft, on which is fixed a pulley or double cam for working the hammer. The shaft may be moved backwards or forwards by a screw, so as to regulate the fall of the hammer.

[Printed, 8*d.*]

A.D. 1858, April 28.—N° 950.

JOHNSON, JOHN HENRY.—"Improvements in furnaces for "the melting and reduction of steel, copper, zinc, and other "metals."—(*A communication from Charles André.*)—*Provisional Protection only.* Compound furnaces are proposed to be employed.

The melting or reducing furnaces are to be disposed round a main central heating furnace, which is "fed with fuel from above, "and is supplied with a hot blast, which inclines or spreads the "flame on two or three of its sides, into a corresponding number "of melting furnaces."

[Printed, 3*d.*]

A.D. 1858, April 29.—N° 956.

JOHANNY, ROBERT.—" Improvements in the construction of " furnaces." These relate to the employment of a closed fire hearth and suitable tubes, whereby the supply of fuel and the emission and supply of combustible gases may be regulated.

The furnaces as specially applied in cases where it required perfectly to consume fuel and smoke, to heat steam boilers and for other purposes.

[Printed, 1*s*.]

A.D. 1858, May 3.—N° 987.

CLARK, WILLIAM.—" Improvements in separating and in other- " wise treating matters in a state of fusion, and in apparatus for the " same."—(*A communication from A. A. A. de Rostaing.*) Liquified metallic bodies or alloys are to be sub-divided into their respective component parts by subjecting them to rotation in the apparatus described. The liquified or fused bodies are placed in a vessel which turns on a vertical shaft; the centrifugal action of the particles it is said causes them to arrange themselves in zones, according to their relative densities.

[Printed, 5*d*.]

A.D. 1858, May 6.—N° 1006.

WHITLEY, JOSEPH.—" Improvements in the manufacture of " iron, which improvements are also applicable when obtaining " other metals from their ores." Furnaces for reducing ores are described, exhaust apparatus is employed to create a current of air. The exhaust apparatus may also be used in combination with blast apparatus.

[Printed, 6*d*.]

A.D. 1858, May 10.—N° 1043.

BELL, ISAAC LOUTHIAN.—" Improvements in the manufacture " of iron." The object of the improvements is to mix atmospheric air with the carbonic oxide generated in smelting furnaces, so as to insure its perfect combustion. This is to be done by introducing currents of heated or cold air into the furnace at the higher parts

of it, "among such carbonic oxide, taking care to do so when the " iron stone, lime stone, or other materials used" in the manufacture of the iron are separated from the fuel used in its reduction.

A furnace having suitable tuyeres and injecting apparatus for effecting the object required is described with drawings.

[Printed, 7*d.*]

A.D. 1858, May 11.—N° 1049.

LUIS, JOZÉ.—"A mechanical washing apparatus for iron ore " and other matters." — (*A communication.*) Apparatus for washing ores is described with drawings.

The matters to be washed are contained in a series of inclined troughs, which are arranged in a tube, in such a way that the matters required to be washed advance regularly in a direction opposite to that of the water. The water enters by a hole on one side of the machine, the ores by a larger hole at the opposite side.

[Printed, 10*d.*]

A.D. 1858, May 11.—N° 1055.

PARKES, ALEXANDER.—"Improvements in the manufacture " of tubes and cylinders." Instead of employing cast cylinders of copper, German silver, or other alloys of copper cast discs or discs cut from comparatively thick sheets of those metals or alloys are used. The discs are " subjected to a raising process by means " of forcers," actuated like steam hammers. The discs are raised by dies through which the metal "is forced or drawn through," and are made into short thick tubes whose ends are cut or removed, or the discs may be forced into hollow dies such as are used in stamping sheet metal. The short tubes are then extended by rolling or drawing them.

[Printed, 3*d.*]

A.D. 1858, May 17.—N° 1094.

ALLEN, JOHN and ALLEN, WILLIAM.—"Improvements in " the treatment of iron and copper pyrites, and in apparatus for " the same." The atmospheric air is made to pass through the mass of pyrites, treated to produce sulphuric acid by a downward

draught instead of an upward one as usual. The lower part of the pyrites kiln is connected with the ordinary leaden chamber, and the air is admitted at the open top of the kiln. The sulphurous acid formed above is thus forced down through the heated mass below, and is converted into sulphuric acid.

A downward draught is also employed in the furnace used to smelt the residuum of copper pyrites.

A kiln may be combined with a reverberatory furnace, and the waste heat from the furnace employed in calcining iron or copper pyrites mixed inlumps with common salt."

[Printed, 7*d.*]

A.D. 1858, May 17.—N° 1100.

HILER, Selah.—"An improved method of coating or amal-" gamating iron with silver, copper, brass, or other metals or " alloys of metals."—*Provisional Protection only.* The iron surfaces required to be coated with the more costly metals are heated, and the latter are to be then cast upon the iron, and united therewith, by the aid of borax or suitable fluxes. The iron so coated may afterwards be rolled.

[Printed, 3*d.*]

A.D. 1858, May 17.—N° 1102.

HIGGS, Samuel.—"An improvement in separating or pre-" cipitating copper from water having it in solution." Water containing copper is placed in suitable wooden vessels or tanks. Scrap iron is then introduced, and the water is heated by preference, by means of jets of steam. Copper is thus precipitated.

[Printed, 3*d.*]

A.D. 1858, May 18.—N° 1107.

CROLL, Alexander Angus.—"Improvements in the treat-" ment of sulphate of alumina and in obtaining alum." In the preparation of sulphate of alumina "as small a quantity of acid " (oil of vitriol) as possible" is used. The remaining free acid is neutralised by adding soda or potash "in proportion equal to " one fifth of the resulting quantity obtained."

In producing alum instead of using only the sulphates of ammonia or potash, one fifth of sulphate of soda is mixed therewith.

[Printed, 3*d.*]

A.D. 1858, May 19.—N° 1111.

BROWN, JEREMIAH.—" Improvements in the manufacture of " iron, and in rolling iron and steel, and in machinery to be " employed therein." Steam power is employed to work a jointed rabble, introduced through the top of the puddling furnace. Self-acting apparatus is used for transferring the bloom to the rolls. Grooved bars are made up into piles, the bars being arranged in suitable forms to give the required strength. Hot and cold pieces of iron are sometimes rolled together to form girders."

[Printed, 2s. 3d.]

A.D. 1858, May 19.—No. 1113.

MACNAUGHT, WILLIAM, and CRITCHLEY, WALTER RICHARD.—" Improvements in the manufacture of copper or other " metallic rollers or cylinders for printing fabrics, and in apparatus " connected therewith." The copper cylinder is made with its ends thicker and stronger than the body thereof. The cylinder is strengthened by applying to its interior suitable " ferrules or " rings or ribs."

[Printed, 10d.]

A.D. 1858, May 19.—N° 1114.

MAUDSLAY, JOSEPH.—" An improvement in the manufacture " of iron, and in the furnaces employed therein."—*Provisional Protection.* It is proposed " to impart motion to molten iron by " inclining the bed of the furnace containing it," and to cause the bed to rotate by suitable machinery. The object is to " im- " prove the tenacity and fibrous quality of the iron," and to " facilitate the escape of gaseous impurities."

[Printed, 3d.]

A.D. 1858, May 21.—N° 1134.

MUNTZ, GEORGE FREDERICK.—" An improvement in preparing " yellow metal sheathing." Yellow metal or " Muntz metal " sheathing is rolled hot till it is brought to within about five per cent. of the desired gauge. It is then annealed and finally rolled cold. This cold rolling process hardens it and renders it more desirable.

[Printed, 3d.]

A.D. 1858, May 22.—N° 1148.

PRICE, Astley Paston.—" Improvements in the treatment " and smelting of certain argentiferous or silver ores." Argentiferous ores when pulverized and mixed with bituminous substances and suitable fluxes (see ante, Nos. 828–830, pp. 376–7) are subjected to pressure, and thereby consolidated or solidified.

[Printed, 3*d.*]

A.D. 1858, May 22.—N° 1149.

PRICE, Astley Paston—" Improvements in the treatment of " certain zinc ores and compounds of zinc, and in the manu- " facture of zinc and oxide of zinc." The zinc ores when reduced to a state of fine division, and mixed with bituminous substances, (see ante Nos. 828–9, pp. 376–7,) are subjected to pressure. In the compressed state they are reduced in suitable furnaces."

[Printed, 4*d.*]

A.D. 1858, May 25.—N° 1162.

PHILLIPS, John Arthur.—" Improvements in the production " of zinc, lead, copper, and silver, from ores containing these " metals."—*Provisional Protection only.* The ores, after having been roasted, are treated by the English, Belgium, or Silesian processes. The residues when withdrawn from the reducing apparatus, are to be fused in a blast or reverberatory furnaces, with or without the addition of " plumbiferous matter."

[Printed, 3*d.*]

A.D. 1858, May 25.—N° 1171.

COURAGE, John.—" Improvements in furnaces for smelting " and calcining." The furnaces are constructed with " a hang- " ing or other bridge, in combination with one or more dampers." These are so arranged that the heat and flames may be shut off from the pots, or from heating chambers connected with the furnace, when required.

[Printed, 3*d.*]

A.D. 1858, May 27.—N° 1189.

ENGERT, Adam Cyrus.—" A method of preparing tin foil or " leaf in order to its employment as a substitute for silver leaf."

—*Provisional Protection only.* It is proposed to prepare tin foil by mixing with the metal before it is rolled out into leaf borax and nitrate of potass. The foil may be afterwards coated with a solution of borax and nitrate of potass.

[Printed, 3*d.*]

A.D. 1858, June 3.—N° 1250.

DALTON, George.—" Improvements in furnaces for smelting " the ores of iron and other minerals."—*Provisional Protection only.* It is proposed to make melting furnaces of small dimensions, and to employ in connexion with the smelting furnace heating furnaces having fires like reverberatory furnaces. A comparatively small quantity of fuel is introduced with the charge.

[Printed, 3*d.*]

A.D. 1858, June 8.—N° 1289.

BROOMAN, Richard Archibald. — " Improvements in the " manufacture of copper pipes and tubes."—*Provisional Protection only.* It is proposed to deposit copper by the electro-galvanic process upon a core of lead, or other fusible metal or material. The core is afterwards to be removed by melting it.

[Printed 3*d.*]

A.D. 1858, June 14.—N° 1343.

SHRAPNEL, Henry Needham Scrope.—" An improvement " in preparing iron and other metals, or mixtures of metals, for, " and in casting the same in moulds."—*Provisional Protection only.* The metal when ready for the casting operation in the furnace is to be " subjected to a mechanical stirring." When the metal is run into the mould the stirring is continued by suitable apparatus, until the solidification takes place.

[Printed, 3*d.*]

A.D. 1858, June 14.—N° 1346.

JOHNSON, John Henry.—" Improvements in machinery, &c. " for crushing ores and other hard and brittle substances." (*A communication from Eli W. Blake, New Haven, U.S.*) The

crushing apparatus consists of a pair of vertical jaws, one or both being moveable vertically. The jaws have their acting faces corrugated vertically, and made convergent downwards. The ores and materials are fed in at thewide part, and are crushed between the narrow parts. Suitable apparatus is described with drawings for giving the feeding and vibrating motion.

[Printed, 6*d.*]

A.D. 1858, June 15.—N° 1354.

KNOWLES, Sir Francis Charles.—" Improvements in the " fabrication or manufacture of steel." Converted steel or steel ingots are put into air-tight retorts without charcoal or other carbonaceous matter. They are then heated, the air being carefully excluded until the "temper" shall have become even through the mass, and the steel becomes homogeneous; it is then withdrawn and covered up with coke siftings, and allowed to cool gradually.

[Printed, 3*d.*]

A.D. 1858, June 16.—N° 1368.

STEVEN, Thomas.—" Improvements in making moulds for " casting." The specification and drawings describe " a mode " of making external moulds for casting pipes, and various other " articles, which can be divided into symmetrical halves by " bissecting planes." The halves are adjusted by the " coinci- " dence of at least two pairs of counterpart points in their sec- " tional surfaces." A mode of making cores is also described."

[Printed, 7*d.*]

A.D. 1858, June 17.—N° 1376.

CROCKFORD, Charles.—" Improvements in the treatment " of the ores of zinc, and in spelter making."—*Provisional Protection only.* Sulphurets of zinc are calcined in a furnace, into which they are introduced in small quantities at one end of a chamber. The floor of the chamber is heated below by flues, and heated air is passed through the chamber, and carries off the sulphurous acid, which is then converted into sulphuric acid. Carbonate of zinc is treated with sulphuric or muriatic acid. Muriatic acid gas and steam are injected into the flues of retort

furnaces used in spelter making. The residue from the retorts is reduced in a blast furnace, whose vent is conducted into a cistern of water. The oxide of iron is reduced in the furnace, the fumes of the oxide of zinc are carried forward, condensed, and collected in the water.

[Printed, 3*d.*]

A.D. 1858, June 22.—N° 1410.

KENWORTHY, William Edward." — "Improvements in " manufacture of steel." — *Provisional Protection only.* It is proposed to use woollen rags or waste, as a substitute for charcoal in the manufacture of steel. Economy is thereby effected.

[Printed, 3*d.*]

A.D. 1858, June 23.—No. 1415.

SPENCER, Thomas.—" Improvements in the treatment of iron " ores, and ferruginous sands, and certain applications arising " therefrom." " A new compound substance" is formed by mixing ores of iron, or ferruginous sand with carbonaceous matters in suitable proportions, and subjecting the mixture to a low red heat in air-tight retorts or chambers. The compound called " magnetic carbide," is used for the purification of water, air, and other matters. It may also be used for making steel."

[Printed, 5*d.*]

A.D. 1858, June 25.—N° 1436.

MAUDSLAY, Joseph.—" An improvement in the construction " of furnaces for melting iron, steel, and other metals." Furnaces are described with drawings so constructed that the bed of the furnace is made to rotate round an axis by suitable machinery. The object is to keep the molten metal in motion to enable gaseous impurities to be driven off, and to effect the proper mixture of alloys."

[Printed, *d.*]

A.D. 1858, June 29.—N° 1468.

GREAVES, Hugh.—" Improvements in apparatus for moulding, " casting, and coating metal articles."—*Provisional Protection only.* It is proposed to use a horizontal frame, supported and

revolving on a vertical axis. Below the frame is a bench on which the moulding boxes may rest.

The moulding boxes are attached to the frame at intervals, and are to be made to rotate and used in turn as required.

[Printed, 3*d*.]

A.D. 1858, July 1.—N° 1481.

WINSHURST, HENRY WILLIAM.—"Improvements in manu- "facturing sheet metal." In making sheet metal, as sheets of lead or tin foil, a cylinder or block of the metal intended to be formed into sheets is first cast in a mould; it is then acted upon by a knife or cutting tool, and reduced to the sheet or foil form.

[Printed, 9*d*.]

A.D. 1858, July 2.—N° 1484.

MORRIS, JOHN.—"An improved construction or improvements "in the construction of copper rollers or cylinders for printing "fabrics."—*Provisional Protection only.* It is proposed to bore out the copper roller to fit the usual mandrel, then to enlarge the bore at each end, and so reduce weight, then fit into each end suitable copper rings bored to fit the mandrel.

[Printed, 3*d*.]

A.D. 1858, July 3.—N° 1505.

HAEFFELY, EDWARD.—"Improvements in recovering oxides "of manganese from products arising out of the manufacture of "chlorine, and in raising commercial manganese to higher "oxides." The liquor from the vessels in which chlorine gas is generated is allowed to flow upon limestone, or carbonate of lime, or baryta, until the free acid is neutralized. It is then boiled with the pulverised limestone or carbonates. Peroxide of iron is sepa- rated "by filtration or subsidence from the solution, from which "manganese is precipitated by free lime."

The precipitate is boiled, and filtered, and dried, and finally subjected to heat in a closed or muffle oven. The contents of the oven are "lixiviated with weak hydrocloric acid" or refuse chloride liquor. Manganese "in a high state of oxidation "remains."

[Printed, 3*d*.]

A.D. 1858, July 5.—N° 1507.

BROOMAN, Richard Archibald.—" Improvements in the " manufacture of cast steel."—(*A communication.*) Fragments of iron or steel of any description are mixed with a composition formed of oxide of iron or manganese, carbon (as resin or soot), and potash, soda, lime, or other alkaline or earthy materials, in the state of an oxide of salt.

The materials are intimately mixed with water or other suitable solvent, and spread evenly over or between layers of the iron or steel. " To convert iron or steel of inferior quality into good cast " steel, about 3 per cent. of alkaline material and from 2½ to " 3 per cent of carbon " will be required.

[Printed, 3*d.*]

A.D. 1858, July 7.—N° 1523.

HOLLAND, John, and POTTS, Ferdinand.—" Certain im- " provements in ornamenting metallic bedsteads, and which said " improvements are also applicable to the ornamenting other " metallic surfaces." These consist in applying protecting coating to metallic surfaces, such as those of brass or german silver in suitable patterns, so that the bright surface is made to produce an ornament similar in effect to that of gold or silver leaf. Iron surfaces are similarly treated, so as to have the appearance of being enamelled.

[Printed, 5*d.*]

A.D. 1858, July 7.—N° 1528.

WESTON, Joseph Dodge.—" Improvements in rolling iron for " the manufacture of bolts and pins."—Bars of iron are rolled of the required circular, elliptical, or other section, and are then passed through suitably indented rollers. The indentations of the rollers form at required distances suitable projections on the bars, which are cut up into the required lengths, the projections forming the head and neck of the bolt.

[Printed, 8*d.*]

A.D. 1858, July 13.—N° 1569.

WEBSTER, James.—"An improved manufacture of certain "kinds of metallic ingots." — *Provisional Protection only.* When an ingot is required to be made of two different metals or alloys, so as to produce, when rolled, a sheet with a required surface, a hollow ingot of the required surface metal is to be used. It is filled with the metal intended to form the interior, and rolled.

[Printed, 3*d.*]

A.D. 1858, July 16.—N° 1608.

PRICE, Astley Paston.—"Improvements in the treatment "and smelting of certain ores or compounds of tin, and of tin, "and of certain alloys thereof." Ores of tin, or oxides of tin, or its alloys, which may be artificially prepared, when pulverised, and mixed with carbonaceous matters, and pressed or coked, are mixed with suitable fluxes, and reduced in a cupola blast or reverberatory furnace.

[Printed, 4*d.*]

A.D. 1858, July 17.—N° 1613.

SPENCE, James.—"An improvement in the manufacture of "tin plates, and terne or leaded plates." Steel made by or with the process of puddling without "cementation or conversion," and called "puddled steel" is made into bars.

These are sorted into classes according to the quantity of carbon they contain, and are piled, the hardest being outside, and are rolled into sheets.

The rolling and heating processes are repeated as often as may be requisite, and the plates are pickled and annealed.

They are then tinned with "ten per cent. less tin" than is required for charcoal iron plates. They may be made elastic by exposing them when heated to extreme cold in a suitable refrigerator.

If soft edges are required for the plates they are subsequently dipped into molten tin to the required depth.

[Printed, 3*d.*]

A.D. 1858, July 20.—N° 1635.

HILL, JOHN CARTWRIGHT.—"Improvements in making joints "for connecting pipes and other articles by means of lead or "other soft metal." The ends of the pipe to be joined are inserted in a collar of suitable soft metal of the required diameter.

A compressing tool is then used. It consists of a cylindrical iron case, which confines the collar, while a punch or collar is forced into one end of the case by lever. The compression forms a tight joint.

[Printed, 7*d.*]

A.D. 1858, July 20.—N° 1637.

DOLEY, CHARLES, BIGLAND, EDWIN, and WORRALL, THOMAS HENRY.—"Improvements in ornamenting metallic and "non-metallic surfaces." Suitable protecting compositions are applied to the surfaces in the required patterns by employing designs etched upon glass plates, and transferred. Figures and ornamental designs are then formed by the action of suitable acids.

[Printed, 3*d.*]

A.D. 1858, July 22.—N° 1656.

THIERRY, JEAN BAPTISTE PIERRE ALFRED, junior.—"Im"provements in furnaces."

Atmospheric air mixed with superheated steam is injected into furnaces above the fuel on the fire bars.

The steam may be superheated by passing it through hollow fire bars.

[Printed, 10*d.*]

A.D. 1858, July 28.—N° 1706.

MILES, JOHN.—"Improvements in annealing pots used in the "manufacture of iron, steel, and other metals." The annealing pots are made with two open ends. One end, which is ordinarily closed by a solid casting, is closed by a moveable lid, which rests on a ledge formed inside the pot. The lid and the pot have

grooves, which mutually fit, and the lid is luted by a covering of clay.

The stand for the pot is constructed with gauge pieces or projections on the plate or bottom on which the pot stands; these prevent the pots from having a tendency to collapse, and serve as guides in piling the plates required to be annealed.

[Printed, 6*d.*]

A.D. 1858, July 30.—N° 1721.

SPENCE, James.—"An improvement in the manufacture of "sheet, hoop, and nail-rod iron."—*Provisional Protection only.* Sheets, hoops, and rods, instead of being made from charcoal iron or converted steel, are proposed to be made from puddled steel, produced directly from pig iron in the puddling furnace.

[Printed, 3*d.*]

A.D. 1858, August 3.—N° 1754.

TAYLOR, William.—"An improvement in the manufacture of "iron." Streams or currents of hydrogen gas are injected into "molten crude iron while yet in the crucible of an iron smelting "furnace." Suitable apparatus for generating the gas and injecting the currents below the surface of the metal is described, with drawings.

[Printed, 6*d.*]

A.D. 1858, August 4.—N° 1767.

SPENCE, James.—"An improved method of rolling sheets from "puddled steel or steel iron."—*Provisional Protection only.* It is proposed to roll sheets of puddled steel until they require to be doubled, and then to reheat them in a furnace and roll them once or twice. A low and gentle heat is to be maintained. If used for making tin plates the tinned plates are cooled in a chamber artificially cooled.

[Printed, 3*d.*]

A.D. 1858, August 4.—N° 1772.

CLAY, William.—"An improved manufacture of metallic "hoops, bands, and other analogous articles." The articles are made of steel. By preference, puddled steel or wrought steel is

used, which may be rolled from one billet or from piled bars. When bars or hoops of a good quality are required the billet is repeated as often as may be required.

To improve their finish the bands or hoops are subjected to the process of cold rolling. They may be previously "pickled" to cleanse them from scale. Grease may be applied during the rolling.

[Printed, 3*d.*]

A.D. 1858, August 5.—N° 1786.

CLAY, WILLIAM.—" An improved mode of manufacturing cast " steel and wrought iron into ingots and other forms."—*Provisional Protection only.* Instead of using a considerable number of separate melting pots, it is proposed to construct fixed retorts in a suitable furnace. These may be tapped, and their contents run together through suitable channels into a common receptacle or mould.

[Printed, 3*d.*]

A.D. 1858, August 7.—N° 1796.

LOCK, GEORGE PEARCE.—" Improvements in the composition " of paints for coating iron ships, and for other useful purposes." —*Provisional Protection only.* To form the inner coating, mix 50 per cent. of iron ore ground in boiled linseed oil with 50 per cent. of oil and turpentine. To form the outer coating, mix white lead 40 per cent., copperas 10 per cent., and oil and turpentine 50 per cent.

[Printed, 3*d.*]

A.D. 1858, August 7.—N° 1798.

WEBSTER, JAMES.—" A new or improved metallic alloy."—*Provisional Protection only.* To form an alloy resembling German silver, mix 6 parts of nickel, 12 of tin plate scrap or galvanised iron, 57 of copper, and 24 of zinc. In fusing the several metals, 6 parts of litharge may be used to serve as a flux.

[Printed, 3*d.*]

A.D. 1858, August 7.—N° 1804.

WALKER, James.—" Improvements in machinery or apparatus " for moulding or shaping metals." Collapsable core bars are employed. The main shell or barrel consists of a thin cast-iron pipe, having longitudinal slots formed in its periphery; into these slots wedge pieces are fitted and adjusted to form the required diameter.

[Printed, 7*d.*]

A.D. 1858, August 12.—N° 1841.

SMITH, Edwin.—" An improvement in puddling iron."—*Provisional Protection only.* It is proposed to introduce streams of air into puddling furnaces, between the sides and ends, and the protecting materials with which they are lined. The object is to preserve the furnace from being wasted away.

[Printed, 3*d.*]

A.D. 1858, August 12.—N° 1844.

JOBSON, Robert.—" Improvements in apparatus for crushing " and sifting." A rotating sieve is used, having longitudinal bars, on which are fixed perforated plates or wire gauze. The sieve is supported externally on rollers, and in its interior are fixed a hopper and crushing rollers. When the materials are not sufficiently crushed to pass through the sieve, they are raised by suitably arranged shelves, and again passed through the rollers.

[Printed, 6*d.*]

A.D. 1858, August 14.—N° 1859.

SLATE, Archibald.—" Improvements in blast furnaces, and in " smelting iron ore." The mouth of the furnace is made very wide; across the top is placed a bridge, supported on iron girders. From the bridge descends a cast-iron pipe or tube, into which fuel is fed;. the tube is covered with a weight which prevents the draught from passing up. Round the tube, fuel and the charge may be fed in in the usual way, and through it, the fuel is introduced into the furnace at the part where it is required for combustion.

[Printed, 11*d.*]

A.D. 1858, August 24.—N° 1920.

SCHRADER, Carl Adolph.—" An instrument to be used in " boring for mining or other purposes."—*Provisional Protection only.* It is proposed to employ a metallic boring bar, having a head provided with three chisel-pointed cutters. The instrument turns on the point of the centre cutter, which is longer than the others.

[Printed, 3*d.*]

A.D. 1858, August 28.—N° 1950.

IRELAND, Jonathan.—" Improvements in cupola furnaces." Additional tuyeres are employed, which are placed higher than those ordinarily used.

The blast introduced through the upper tuyere brings the metal into a state of fusion at a high part of the furnace, and purifies it as it descends.

[Printed, 9*d.*]

A.D. 1858, August 31.—N° 1979.

ROSE, William.—" An improvement or improvements in piling " or combining metals to be used in the manufacture of arms and " cutlery, and for other similar purposes." Rods of various kinds of iron and steel are piled or combined together, so as to form a figure or give a twisted appearance.

[Printed, 3*d.*]

A.D. 1858, September 1.—N° 1988.

NEWTON, Alfred Vincent.—" Improvements in the manufac- " ture of alumina."—(*A communication from M. L. Chatelier, Paris.*) Various processes are described " grounded upon the principle " involved in the artificial formation of a combination between " alumina and soda, or of aluminate of soda, soluble in water, " mixed with an excess more or less considerable of soda or car- " bonate of soda."

[Printed, 5*d.*]

A.D. 1858, September 13.—N° 2075.

HANBURY, Sampson.—" An improvement in the manufacture " of tubes of copper, brass, and other metals." The tubes are made thicker at their ends than at their centre parts. This construction is intended to afford facilities for fixing the tubes.

[Printed, 6*d*.]

A.D. 1858, September 20.—N° 2115.

RIEPE, Ewald.—" An improvement in the casting of steel."—*Provisional Protection only*. It is proposed to prevent the formation of bubbles or honeycombs in the steel, by heating the mould in any convenient manner prior to the pouring in of the steel,

[Printed, 3*d*.]

A.D. 1858, September 21.—N° 2116.

LEVI, George Montefiore.—" Improvements in the manufac" ture of iron in the blast furnace."—(*A communication.*) The blast, instead of being constantly injected, is alternately stopped and put in action at regular intervals. Suitable apparatus provided with valves and stops is described with drawings.

[Printed, 8*d*.]

A.D. 1858, September 21.—N° 2121.

BETHELL, John.—" Improvements in treating pyrites." The pyrites or sulphurets of iron are ground between rollers, and then washed to free the sulphuret from coal and other matters. The nearly pure sulphuret is employed in making sulphuric acid or sulphur.

[Printed, 3*d*.]

A.D. 1858, September 22.—N° 2134.

SPENCE, James.—" Improvements in the manufacture of steel, " and in the furnaces employed in such manufacture." In manufacturing steel directly from pig iron, the first stage requires heat with oxygen, the second heat without oxygen, to insure that the decarbonization shall be carried to and no further than the exact degree required. To effect this object a puddling furnace is used, which has two grates, one behind the other, divided by a *bridge*, and having closed ash pits.

At the commencement of the operation the air is admitted through the open doors of both ashpits; afterwards, when the iron is melted, the door of the outer ashpit is closed. Atmospheric air is supplied through the door of the inner grate, and is deprived of its oxygen as it passes over the burning coals, and is in that state supplied into the puddling furnace while the iron is "coming "to nature," or becoming solidified. To make steel of a full degree of hardness, hematite ore is used by preference.

Where equal diffusion of fluxes can be depended upon, and good quality of steel is required, muriate of ammonia is used; the next best flux is sesquicarbonate of soda; where economy is an object common salt may be used.

[Printed, *7d.*]

A.D. 1858, September 23.—N° 2139.

HINDE, THOMAS CALLENDER.—"An improvement or improve-"ments in the manufacture of iron and steel." The iron during its conversion into steel or wrought iron is treated with a mixture of hydrochloric or sulphuric or nitric acid and common salt, which is mixed with the fused metal.

Two parts by weight of the mixture may be mixed with 100 parts of fused iron in the puddling furnace.

[Printed, *3d.*]

A.D. 1858, September 27.—N° 2162.

BENZON, EDMUND LEOPOLD.—"Improvements in the manu-"facture of steel."—(*A communication from F. A. Lohage, of Unna, in Prussia.*) In the puddling operation the iron must be raised beyond a bright red heat. When the globules of iron which rise to its surface and break through the cinder assume a pointed or pear-like shape, the iron has just enough carbon to make a hard steel. The decarbonization must therefore be arrested at that point by closing the damper or otherwise. If a milder steel is required, the decarbonization may be continued a short time longer.

[Printed, *4d.*]

A.D. 1858, September 30.—N° 2183.

RUSSELL, John James.—"Improvements in furnaces for "heating iron and steel suitable for the manufacture of welded "tubes and other articles." The specification and drawings describe a compound furnace having two working compartments and doors on opposite sides, separated by a bridge.

[Printed, 1s. 3d.]

A.D. 1858, October 4.—N° 2203.

NORMANDY, Louis A., junior.—"Improvements in the ma-"nufacture of sulphate of copper."—(*A communication.*) Three wooden vessels, placed one below the other, are used. Copper scraps are placed therein, and sulphuric acid, diluted with water to about 10° or 12° Beaume and heated to about 86° to 100° F., flows into the upper, and thence through the lower vessels, and dissolves the copper. The solution obtained is crystallised in a copper or wooden or leaden vessel.

[Printed, 3d.]

A.D. 1858, October 5.—N° 2207.

BESSEMER, Anthony.—"Improvements in the manufacture "of iron and steel, and in apparatus to be employed therein." The specification and drawings describe a revolving reverberatory furnace, consisting of a cylindrical iron vessel, with two narrowed necks, which form bearings. The interior is lined with segmental fire bricks, the metal is run into it and heated, while the furnace is turning at the same time; currents of air or steam are injected and act on the surface of the metal, and carry off the impurities.

[Printed, 10d.]

A.D. 1858, October 6.—N° 2217.

LUIS, Jozé—"A new method of joining sheet iron, cast iron, "gutta percha and other tubes, by means of muffles."—(*A com-"munication.*) Tubes of iron, copper, and other metals are joined by means of cast or wrought iron muffles, which have been previously tinned. A cylindrical ferrule of soft metal, as lead, is introduced.

[Printed, 1s. 1d.]

A.D. 1858, October 8.—N° 2243.

LANCASTER, Charles William. — " A metal or metallic " alloy, especially adapted to the manufacture of fire-arms and " ordnance." Ninety parts of copper are alloyed with ten parts of aluminium. The alloy may be forged and rolled like iron or steel, and be used for ordnance and barrels of small arms. It is said to bear a tensile strain of 97,000lbs. as compared with 32,000lbs. strain borne by the gun metal used by the British Government. From its not being liable to oxidation, the alloy may be used for rifle barrels, elevating screws, tangent sights, &c.

[Printed, 3*d.*]

A.D. 1858, October 8.—N° 2247.

GERHARD, Frederick William.—" Improvements in the " manufacture of aluminium and sodium." A double furnace, having two heating chambers or crucibles, one lower than the other, is employed. The double chloride of sodium and aluminium, or the double fluoride "known as cryolite," or both these substances combined, are heated in the lower furnace. Chloride of sodium mixed with cryolite, or slag obtained in producing aluminium, is heated in the upper furnace and then run down into the tower furnace so as completely to cover the substance placed therein. A greater percentage of aluminium is thus obtained.

[Printed, 3*d.*]

A.D. 1858, October 14.—N° 2289.

GORDON, Alexander.—Improvements for manufacturing cast " iron, steel, and wrought iron."—(*A communication from A. G. Cazalat, of Paris.*) Pig iron is decarbonised by injecting steam at a high temperature mixed with hydrogen and carbonic oxide and air in the blast furnace, or in a suitable crucible. Currents of hydrogen and carbonic oxide with heated air may be injected into a furnace employed in making steel. Coal or wood may be used instead of coke.

[Printed, 5*d.*]

A.D. 1858, October 21.—N° 2347.

ALGER, Charles Coffey.—" Improvements in cupola fur" naces." — *Provisional Protection only.* An elliptical or elon-

gated form of furnace is to be used. A series of blast pipes or openings are ranged all round "in order to introduce the blast "in the direction and breadth of the hearth."

[Printed, 5d.]

A.D. 1858, October 22.—N° 2361.

BAGNALL, JAMES, and BAGNALL, WILLIAM.—"An im- "provement in the manufacture of iron." In making bars for forming piles the bars are rolled through grooved rollers instead of plain rollers. The grooved bars are piled and formed into box piles, and rolled in the usual way.

[Printed, 8d.]

A.D. 1858 October 27.—N° 2397.

GARDINER, PERRY GREEN.—"Furnaces for re-heating steel, "preparatory to hardening, tempering, or annealing."—*Provisional Protection only.* It is proposed to employ a closed oven or chamber, in which the metal is placed. Heat is applied over, under, and at the back of the chamber, while its interior has no communication with the flames or gases of combustion, or the external air.

[Printed, 3d.]

A.D. 1858, October 28.—N° 2409.

MUNRO, WILLIAM.—"A new manufacture of capsules and "other metallic articles." Sulphate of tin is obtained by dissolving tin in muriatic acid and precipitating a carbonate of tin, by means of common soda. The precipitate is washed and dissolved in sulphuric acid. Sulphate of tin is thus obtained, which is used in forming a solution and coating lead by the electro-galvanic process.

[Printed, 3d.]

A.D. 1858, October 29.—N° 2417.

DIXON, JOSEPH.—"A method of manufacturing steel."—*Provisional Protection only.* Cast iron in the form of plates, about ½ an inch thick, is to be placed in a cementing furnace, and

stratified with sand, ashes, or charcoal. It is then subjected to heat for two or three weeks, and is converted into steel resembling the blistered steel of commerce.

[Printed, 3*d.*]

A.D. 1858, October 29.—Nº 2423.

MORRIS, JOHN.—" Improvements in the manufacture of rollers " or cylinders for printing fabrics." A drawing process is employed for fitting the interior bore of the rollers to fac similes of the printers' mandrels.

The interior bore of the roller may be left smaller than that part of the mandrel upon which it is to be fitted, the mandrel being taper. The roller is elongated by drawing it till it covers the part it is intended to fit. Or the interior bore of the roller may be left larger than the mandrel, and closed in and fitted thereto by drawing it.

[Printed, 9*d.*]

A.D. 1858, November 6.—Nº 2486.

WEBSTER, BARON DICKINSON, and HORSFALL, JAMES.— " An improvement in the manufacture of steel wire." The wire is first " hardened," by heating and suddenly cooling it. It is then plunged into a bath of fused alloy, consisting of 40 parts of lead, 12 of zinc, 26 of antimony, 21 of tin, and 1 part of bismuth. It remains therein for a time, varying with the thickness of the wire. It is then withdrawn, and sprinkled with cold water. The use of the tempering bath increases the tenacity of the wire.

[Printed, 4*d.*]

A.D. 1858, November 6.—Nº 2489.

JACKSON, JAMES, FISHER, AARON, and HARVEY, JOHN JONES.—" Improvements in the manufacture of strips or bands " of steel, and in the machinery or apparatus employed therein." The strips or bands of steel, instead of being subjected to the process of cold rolling, are heated in a suitable furnace, and are then rolled hot.

Broad strips or sheets are thus hardened and tempered, and are then cut up into narrow strips by suitable shearing machines.

[Printed, 1*s.* 2*d.*]

A.D. 1858, November 10.—N° 2517.

NORMAN, JOHN, and HANNAH, ROBERT.—"Improvements "in furnaces."—*Provisional Protection only.* The bridge at the inner or back end of the grate bars, is to be formed with passages divided by vertically disposed slabs of fire brick, fronted with cast iron bars, forming a grate surface, by preference, inclined backwards from the grate bars.

Channels admitting air from the ashpit communicate with these passages.

[Printed, 3*d.*]

A.D. 1858, November 12.—N° 2538.

COCKER, THOMAS FILDES.—"Improvements in the manu-"facture of steel and iron wire, also of sheets and strips of steel." Heated water or other suitable liquid in a heated state, is used for the immersion of wire or sheets of steel, when withdrawn from the annealing pot or oven.

[Printed, 3*d.*]

A.D. 1858, November 13.—N° 2547.

COURAGE, JOHN, and BENNETT, FREDERICK.—"Improve-"ments in furnaces for reducing and smelting ores, scoria, slag, "and waste." The Specification of prior Letters Patent, dated May 25, 1858, (see *ante*, p. 384,) is referred to. The waste heat from the smelting furnace is applied to a horizontal furnace or bed connected therewith. On this bed the "waste" is laid, which is thereby reduced. The degree of heat is regulated by suitable apparatus.

[Printed, 3*d.*]

A.D. 1858, November 23.—N° 2656.

GERMAN, WILLIAM.—"Improvements in furnaces and in the "combustion of fuel, and in apparatus connected therewith." Gaseous fuel is burned in a furnace so constructed that the air is "prevented from getting up through the incandescent coke," when a fresh charge of fuel is laid on. This "prevents the "production of carbonic acid gas, which ordinarily mingles with "and prevents" the combustion of the gases evolved by the fresh charge, and the furnace is thus converted into a kind of gas retort.

[Printed, 9*d.*]

A.D. 1858, November 30.—N° 2731.

BOCCIUS, Gottlieb.—" Improvements in the construction of " furnaces."—*Provisional Protection only.* The air injected into furnaces is to be heated by suitable closed flues, provided with perforated copper plates, and is thrown in at or near the fire bridge at such a temperature that it will " act on the fire like an " atmosphere of oxygen gas."

[Printed, 3*d.*]

A.D. 1858, December 1.—N° 2744.

ADCOCK, Henry.—" Improvements in furnaces and apparatus " for annealing wire." The annealing pot is set in the centre of the furnace in the usual way, and three fire grates are used. These are constructed at equal distances apart, so that the heat is applied uniformly. A pyrometer is used to ascertain the heat in the pot. It consists of a compound bar placed in the centre of the pot, and " suitably connected with a pointing hand " outside the furnace, " in order to shew by the expansion and contraction " of the compound bar the temperature of the interior of the " annealing pot."

[Printed, 10*d.*]

A.D. 1858, December 1.—N° 2750.

FINCHAM, Frederic.—" Improvements in the construction of " annealing kilns or ovens." Pipes of earthenware or stone are placed below the bed under the floor of the kiln or oven. Through these cold air is admitted, the supply being regulated by means of suitable slides, and the floor of the kiln is thereby cooled to the required temperature.

[Printed, 5*d.*]

A.D. 1858, December 1.—N° 2753.

BENZON, Edmund Leopold.—" The manufacture of useful " alloys of aluminium."—(*A communication.*) Alloys of aluminium are formed by the decomposition of alumina or the oxide of aluminium " by means of carbon, in the presence of and in inti- " mate contact with certain metals electro-positive to aluminium " (just, for instance, as copper or iron, or their oxides)."

This protoxide or peroxide of copper may be granulated and mixed with powdered alumina (obtained from alum or other salts), and heated with powdered charcoal (carbon being slightly in excess).

An alloy resembling gold may be thus produced:—Aluminium zinc, and copper produce hard bronze. Aluminium and iron form a hard alloy, which may be used in the manufacture of cast steel.

[Printed, 4d.]

A.D. 1858, Dcember 11.—N° 2847.

SCHAFFNER, Maximilien. — "Improvements in smelting "zinc ores, and in furnaces employed for this purpose." The specification and drawings describe reducing furnaces. A large chamber or muffle is surrounded and heated by a flue connected with the furnace. At one side of the chamber are holes, through which the zinc ore is introduced.

[Printed, 1s. 4d.]

A.D. 1858, December 16.—N° 2881.

CARMONT, William Hassalwood, and CORBETT, William.—"An improved mode of constructing furnaces for the "production of wrought iron and steel, and manufacturing such "metals into ingots and other forms."—*Provisional Protection only*. The flues of the furnace are to be so constructed "as to "rise perpendicular from the grate, carrying off all the deleterious "gases generated." The smoke and flames are prevented from coming into contact with the metal.

[Printed, 3d.]

A.D. 1858, December 16.—N° 2883.

MUSHET, Robert.—"A new or improved manufacture of cast "steel." Cast iron, which has been decarbonised, or nearly so, by forcing atmospheric air through it, is granulated by running it into water, or is otherwise reduced to small pieces. It is then melted with a "triple compound," formed by fusing together iron, manganese, and carbon. The proportions used vary, the greater the quantity of triple compound used the harder will be the steel resulting. 6 lbs. of the triple compound mixed with 36 lbs. of decarbonized iron form a hard cast steel, or 2 lbs. of the triple compound would form soft steel.

[Printed, 4d.]

A.D. 1858, December 16.—N° 2890.

BROOMAN, Richard Archibald.—"An improvement in "plating and gilding forks, spoons, and other metal articles."—(*A*

communication.) Articles which have received an uniform coating by the electro-galvanic process are heated, and gold or silver leaf is applied to those parts of the articles which may be subjected to wear, and therefore require a greater thickness of coating metal.

[Printed, 3*d.*]

A.D. 1858, December 22.—N° 2921.

MUSHET, Robert.—" An improvement or improvements in " the manufacture of cast steel." Cast iron or deoxydised iron ore is granulated, pulverised, or otherwise reduced, and is melted " with a triple compound," formed by fusing together iron, carbon, and manganese.

The proportions used vary.

[Printed, 4*d.*]

A.D. 1858, December 23.—N° 2935.

BROOM, James.—" Improvements in the manufacture of steel." —*Provisional Protection only.* Pig iron is to be puddled in the furnace in the usual way, " except that the furnace is kept as full " as possible of pure white flame, the atmospheric air being " excluded from it as much as is practically possible."

[Printed, 3*d.*]

A.D. 1858, December 24.—N° 2947.

HUMPHRYS, Edward.—" Improvements in brazing metal " tubes in tube plates and other metal surfaces to each other."— *Provisional Protection only.* Fluid metal is to be used to apply the requisite heat to melt the brass or hard solder used in inserting tubes in tube plates. The tube plate may be supported over the surface of fluid iron, and almost in contact with it, and the heat melts the solder uniformly.

[Printed, 3*d.*]

A.D. 1858, December 27.—N° 2953.

MENNONS, Marc Antoine François.—" An improved com- " position for the protection of certain metallic surfaces."—(*A communication.*) A composition that may be applied to the interior of boilers to prevent incrustation is formed by mixing in a pulverised state oak bark 24½ lbs., salts of soda 31 lbs., wood ash 15 lbs., soda crystals 24½ lbs., ground linseed 4 lbs., graphite 1 lb.

The composition is dried, and when used is reduced to a semi-liquid by mixing it with water, 2 lbs. per cent. of tallow being added.

"The mixture is passed into the generator in the proportion of " about ½ oz. avoirdupois (of the power) per hour for each horse " power."

A saving of from 30 to 40 per cent in fuel is said to be effected.

[Printed, 3*d.*]

A.D. 1858, December 31.—N° 3007.

JOHNSON, JOHN HENRY.—" Improvements in the manufac- " ture or production and casting of steel, and in the apparatus " employed therein."—(*A communication from M. Sudre.*) In producing steel in large masses crucibles are dispensed with, and the steel is manufactured in reverberatory furnaces. The surface of the metal if covered with a protecting material, such as the scoria produced from blast furnaces supplied with wood or coke fuel.

Suitable furnaces are described with drawings.

[Printed, 6*d.*]

1859.

A.D. 1859, January 5.—N° 41.

NEWTON, ALFRED VINCENT.—" An improvement in the process of and improved apparatus for separating metals from their ores."—*Provisional protection only.* It is proposed to amalgamate gold or silver ores, pulverized, in apparatus working in a closed chamber heated by steam. The pulverised ores are placed in receptacles supported on arms, placed radially round the same hubb or boss. Twelve shot more or less, weighing about 6 lbs., are put in with the ores. Rotatory motion is then to be given to the receptacles, and heat to be applied.

[Printed, 3*d.*]

A.D. 1859, January 12.—N° 100.

MUSHET, ROBERT.—"A new or improved metallic alloy." Cast iron, granulated or pulverised, is mixed with tungstic acid or oxides, or ores of tungsten, or wolfram ores, which are by preference, reduced to powder.

By preference, No. 1, iron or pure iron as free as possible from sulphur and phosphorous is reduced to small pieces, which will pass through a sieve having 25 meshes to the square inch. Wolfram ores, containing about 60 per cent. of tungsten, are preferred.

To 24 lbs. of granulated No. 1 cast iron are added 8 lbs. of prepared pulverised wolfram; the mixture is placed in a crucible, and melted in an ordinary steel melting furnace, with or without carbonaceous matters, and wrought iron scrap. The mixture is cast into an ingot, which may be heated to a "fair cast steel heat," and afterwards hammered or rolled.

If the proportion of iron mixed with the wolfram be increased or diminished, a harder or softer alloy will result.

If grey cast iron containing less carbon than "No. 1" be used, 30 lbs. of iron may be mixed with 8 lbs. of wolfram.

[Printed, 4d.]

A.D. 1859, January 12.—N° 101.

MUSHET, ROBERT.—"An improvement or improvements in "the manufacture of cast steel." Cast steel is alloyed with tungsten, tungstic acid, or oxides or ores of tungsten, by preference with wolfram, as it is cheaper, and contains oxide of manganese, which facilitates fusion. The wolfram ore is well pulverised, if it contain 70 to 75 per cent. of tungstic acid, or 60 per cent. of metallic tungsten, it is mixed with an equal weight of melted pitch, and poured upon a slab of stone, previously wet. The following proportions are recommended to be melted in an ordinary crucible, and cast into ingots.

	Blister steel - - - -	46 lbs.
	Wolfram and pitch - - -	1 lb.
Or,	Swedish bar iron - - -	44 lbs.
	Charcoal in nubs - - -	8 oz.
	Wolfram and pitch - - -	1 to 4 lbs.
	Puddled steel - - -	48 lbs.
	Charcoal in nubs - - -	2½ oz.
	Wolfram and pitch - - -	1 lb.

The iron or steel is reduced to small pieces. The hardness of the alloy is increased by using increased proportions of carbonaceous matters or diminished proportions of tungsten.

[Printed, 5d.]

A.D. 1859, January 12.—N° 103.

BESLAY, Charles.—"Improvements in coating or covering "iron and steel with tin, zinc, or lead, or alloys of those metals "by electrical deposit." The metallic coatings deposited on iron by the ordinary process are liable to be detached, owing to the oxidation of the iron. The "hot tinning process" is a partial remedy, but it is injurious to apply heat in certain cases. To prevent the oxidation of the iron solutions of caustic soda and potash are used, instead of acids, for the batteries employed in depositing metals and alloys on the surface of iron or other metals. The adhesion is thus rendered permanent.

The alkaline bath is formed of from 5 to 6 parts metal, 50 to 60 parts caustic potash, 1000 parts water.

To utilize waste scraps of tin or other plates, they are placed in the bath to form one pole of the battery, or instead thereof pieces of lead, tin, zinc, or other metals are made to form the pole, and are decomposed and deposited as coatings in the usual way. In operating with tin the metal or its oxide is boiled in a solution of caustic potash.

[Printed, 3d.]

A.D. 1859, January 15.—N° 132.

MUSHET, Robert.—"Improvements in the manufacture of "cast steel." Cast steel, which is made by melting granulated cast iron or refined iron with oxide of iron or iron ore may be improved by melting therewith a triple compound, composed of iron, carbon, and manganese melted together. To 30 lbs. of granulated grey pig iron, "No. 1" are added 5 lbs. of pulverised hematite or magnetic ore, as pure as possible, and 3 lbs. of the compound formed by preference of white crystalline pig iron, called in Rhenish Prussia, "spiegel eisen," containing, besides iron and carbon, about 8 per cent. of manganese. The mixture is melted in a crucible and cast into ingots. To 36 lbs. of refined cast iron

metal, granulated, are added 3 lbs. of pulverised iron ore, and 3 lbs. of the triple compound. The compound may be added in small portions at different times.

[Printed, *4d.*]

A.D. 1859, January 15.—N° 134.

MUSHET, Robert.—" An improvement or improvements in " the manufacture of cast steel." Cast steel is made by mixing in the melting pot.

1st. Cast iron that has been wholly or partially decarbonised by currents of air being passed through it in a molten state (15 lbs.)

2nd. Deoxydised iron ore, prepared by heating ores or oxides of iron in close vessels, in contact with charcoal, carbon, or hydrogen gas or gaseous or volatile hydro-carbons (15 lbs.)

3rd. The triple compound called " spiegel eisen," being iron combined with 1 to 8 per cent. of metallic manganese, and 2 to 5½ per cent. of carbon (4 lbs.)

The substances are granulated or broken small.

To increase the hardness of the steel, the proportion of the partially decarbonised cast iron is increased.

[Printed, *5d.*]

A.D. 1859, January 17.—N° 139.

SICARD, Pierre Amable de Saint Simon.—" An improved " process and apparatus for converting cast iron into steel." Melted cast iron is granulated by submitting it in a closed vessel (which is described with drawings) to the action of beaters. Nitrate of potash or soda or other oxydising reagents are mixed with the iron in its reduced state.

The granulated iron is melted with carbonaceous matters in a closed furnace. The melted iron is stirred with a rake or bar, having a perforated iron box at its end, containing carbonate of ammonia or nitrate of potash or other suitable nitrates which decarburise the iron. If more carbon is required it may be stirred in by the same apparatus.

[Printed, *6d.*]

A.D. 1859, January, 17.—N° 145.

MUSHET, Robert.—" Improvements in the manufacture of " cast steel."

Cast steel is made by melting and combining scrap steel or bar or blister steel, or their mixtures (about 24 lbs.), with wholly deoxydised iron ore (about 12 lbs.), and the "triple compound," called spiegel eisen (about 5 lbs.) (See *ante*, Patent N° 134.)

The ores, or oxides of iron, are deoxydized by heating them in a closed chamber with carbonaceous matters, and are afterwards pulverized; if they be nearly but not wholly deoxydized, about six ounces of powdered charcoal should be mixed with 12 lbs. of the partly deoxydized ores; to the mixture are added 24 lbs. of the scrap steel, and about 4 lbs. of the triple compound.

To 9 lbs. of the completely deoxydized ores 27 lbs. of wrought or malleable iron, 4 ounces of charcoal, and 5 lbs. of the " triple compound" are added.

With 9 lbs. of partly deoxydized iron ores, 12 oz. of pulverised charcoal, 27 lbs. of wrought or malleable iron, and 4 lbs. of the " triple compound " are melted and combined.

The iron and steel are reduced to small pieces.

The triple compound is either introduced with the other materials into the melting pot, or it is melted in a separate pot, and the requisite quantity of the melted "triple compound" is introduced into each melting pot as required.

[Printed, 5*d.*]

A.D. 1859, January 21.—N° 198.

LAUTH, Bernard.—" An improved mode, &c.," of rolling metals. The specification and drawings describe rolling machinery in which pressing rollers are employed. The articles to be rolled are drawn to and fro by clamps, to which a travelling motion is given. The rollers themselves do not give motion, but act merely as guides and pressers.

[Printed, 10*d.*]

A.D. 1859, January 22.—N° 200.

DROUIN, Louis Auguste.—" Improvements in covering " joinery work with metals or metallic alloys, and apparatus " for the purpose."—*Provisional protection only.* Doors, window

frames, and other articles are to be covered with sheets of metal or metallic alloy by means of "a stretching or drawing bench, or of "a screw press, each furnished with suitable dies, matrixes, or "blocks."

[Printed, 3d.]

A.D. 1859, January 24.—N° 210.

MUSHET, Robert.—"An improvement in the manufacture of "cast steel and iron."—When cast iron is being made into steel by the decarbonizing process, in which currents of air are passed through the molten iron, the quality of the steel is improved by adding from time to time the "triple compound" spiegel eisen (see Patent N° 134) either in a molten or pulverized state.

If about a ton of cast iron be operated upon in the decarbonizing chamber, as soon as the process begins about 3 lbs. of the molten triple compound are poured from a suitable ladle every half minute until the process is completed.

Or from 4 to 6 lbs. of pulverized triple compound may be added every minute.

[Printed, 4d.]

A.D. 1859, January 24.—N° 211.

MUSHET, Robert.—"An improvement in the manufacture of "cast steel."—Pure ores of iron are broken into lumps the size of a hen's egg, and are deoxydized by heating them in a closed chamber with suitable carbonaceous matters. The ores take up some of the carbon, and become a kind of crude steel. This crude steel called "iron ore steel," is broken small, and about 30 lbs. are melted in pots with about 3 lbs. of of the "triple compound," called "spiegel eisen." (See Patent, N° 134.)

By increasing the proportion of the triple compound the hardness of the resulting steel is increased.

To reduce the hardness from 1 lb. to 10 lbs. of wrought iron scrap may be melted with 30 lbs. of crude steel and 3 lbs. of the triple compound. The triple compound may be melted in a separate pot, which may be placed upon the top of the melting pot, and so be added gradually in a fused state. The compound is easily fusible.

[Printed, 5d.]

A.D. 1859, January 24.—N° 217.

WARNER, Arthur, and TOOTH, William.—"Improvements in the manufacture of iron, &c." In the manufacture of iron in blast and cupola furnaces, jets of liquid hydro-carbons are forced in and amongst the iron by means of forcing pumps or other suitable apparatus, described with the aid of drawings.

Apparatus for making hydrogen gas or other liquid hydrocarbons is also deseribed.

[Printed, 1*s*. 1*d*.]

A.D. 1859, January 27.—N° 245.

HARTSHORNE, Thomas.—"An improved metal to be used "for making journey brasses for mills, rollers, forges, and all "kinds of shafts and machinery, and also for shipping, and for "bearings for shafts and journey brasses in general." Iron, copper, tin, and regulus of antimony are alloyed in the following proportions: Iron 4lbs., copper 6 oz., tin 1 oz., regulus of antimony 1 oz. Very large bearings will require more tin, which makes the alloy tougher.

[Printed, 3*d*.]

A.D. 1859, January 28.—N° 260.

YATES, William.—"Improvements in furnaces."—*Provisional protection only*. The fire doors of furnaces are proposed to be made in two parts, moving on an axis or axes. One part is opened "to regulate the admission of the fuel which is thrown in above it." The other is ordinarily closed but may be opened to afford admittance to the furnace, it has in it a slide to admit tools.

Some of the fire bars are moveable and are to be worked by machinery, to force the fuel down upon the bars and keep it stirred.

[Printed, 3*d*.]

A.D. 1859, January 29.—N°. 264.

LEISLER, Louis.—"Improvements in extracting metalli copper "from the pyrites residuum of vitriol works and from other sub-"stances." — (*A communication*.) — *Provisional protection only*. To every ton of pyrites residuum are added from 20 to 50lbs. of muriatic acid diluted largely with water. The copper is dissolved;

when the fluid is sufficiently saturated it is run into another vessel containing pieces of iron, upon which the copper is precipitated. The fluid from which the copper is separated contains "proto-" chloride of iron," it is exposed to the air for some days and is converted into perchloride; a small quantity of muriatic acid is added to it, and the mixture is used to act upon another quantity of pyrites residuum, from which it readily extracts copper.

When the pyrites residuum has not been completely burned it is placed in heaps, moistened with the chloride of iron obtained in the previous operation, and exposed to the action of the air to oxydize the copper, it is then treated with the acidulated solution of perchloride of iron. Instead of muriatic, sulphuric or other acids may be used.

[Printed, 3*d.*]

A.D. 1859, January 29.—N° 270.

BRONAC, Jean Justin Albert de, and Deherrypon Augustin Joseph Martial."—A new or improved process for " treating metallic sulphurets, phosphurets, arseniurets, antimo-" niurets, and particularly sulphuretted ores of lead, antimony, " copper, silver, zinc." The process is based on the energetic re-action to which "spongy iron" is subject. "Spongy iron" is obtained by reducing iron ores at a low temperature, in this state the iron is easily pulverised, and is advantageously used in all metallurgical operations where it is employed in that condition; it has also " an affinity for forming new combinations" which compact iron has not, it is therefore suitable for being combined with metallic sulphurets, as it readily combines with the sulphur. The metallic sulphurets are pulverized, and mixed with pulverized "spongy iron," and by preference compressed into bricks, the quantity of iron being sufficient to form a sulphuret of iron. The mixtures are heated with layers of coal in a furnace in the usual way.

[Printed, 4*d.*]

A.D. 1859, January 31.—N°. 279.

NEWTON, Alfred Vincent.—"An improved method of ex-" tracting gold and silver from their ores."—(*A communication.*) —*Provisional protection only.* The ores are to be pulverized and mixed with chloride of sodium, and roasted in a furnace. The

ores are afterwards ground, mixed with wood ashes and placed in an amalgamator, and worked up with mercury. Pieces of bar iron are to be added to facilitate "trituration and decompose any "chloride of silver that may have been formed during the "previous operation." "Sulphate of iron is added to decompose "chloride of gold." The mass in the amalgamator is treated with hot water.

[Printed, 3*d.*]

A.D. 1859, February 1.—N° 282.

HOSKING, JOHN, and COCK, THOMAS.—"Improvements in "furnaces."—*Provisional protection only.* The back of the furnace where the bridge is ordinarily placed is closed. The ashpit is also closed. "The ordinary fire door is dispensed with, and "the doorway becomes the opening for the admission of the "draught, which will pass down between fire bars to the ordinary "flue leading to the chimney."

[Printed, 3*d.*]

A.D. 1859, February 1.—N° 285.

PLIMSOLL, SAMUEL.—"Mining apparatus for use in mining "coal and other minerals, and also for separating the small coal "and crushed ores from the shale," &c.—*Provisional protection only.* A circular or segmental saw centring in a saddle is to be used instead of a mining pick, and instead of a plain drill one with a screw thread is used.

Instead of using apparatus worked by steam engines for agitating and washing ores, jets of steam are to be injected into the vessel containing the ores to be washed.

[Printed, 3*d.*]

A.D. 1859, February 1.—N° 292.

CROCKFORD, CHARLES.—"A mode or method of producing "metallic sulphates."—*Provisional protection only.* Oxides or chlorides of copper, iron, zinc, and other metals are to be exposed to "the action of sulphurous acid gas, or the vapour of water "charged with air, whereby they become converted into sul-"phates." The sulphurous acid gas now wasted in the reduction of metals may be employed for this purpose.

[Printed, 3*d.*]

A.D. 1859, February 1.—N° 294.

BENTALL, Edward Hammond.—" Improvements applicable " to machinery for grinding or pulverizing ores, &c." Grinding apparatus is described, with drawings; it is enclosed in a chamber, and a blast or current of air is admitted to the bed of the grinding mill, so as to blow away the fine particles as soon as they are formed. The fine dust is conveyed to another closed chamber, in which they are allowed to settle in different compartments, according to their specific gravities, which regulate the distance they are carried by the blast. The air is afterwards reconducted to the blowing machine, so that no particles are lost.

[Printed, 5*d*.]

A.D. 1859, February 2.—N° 301.

TEARNE, Samuel.—" Improvements in ornamenting surfaces." Metallic and non-metallic. The surfaces to be ornamented are coated with gold, or other metallic leaf or bronze, by attaching the leaf thereto with an isinglass or other suitable solution. A design printed in two or more colours upon transfer paper is then transferred to the metallic surface, and becomes permanently attached to it, and is then varnished.

[Printed, 4*d*.]

A.D. 1859, February 14.—N° 411.

WRIGHT, John.—" Improvements in reducing and rolling steel " and iron wire, and other forms of those metals in long lengths." The wire to be reduced is wound on a cast iron reel, and placed in a cast iron box (described with drawings); the box is then placed in a furnace, and heated to the required heat. The box is then withdrawn, and placed near the reducing rolls, and one end of the wire is conducted from the reel to the rolls; the wire upon the reel retains its heat for a considerable time, and by this means long lengths may be operated upon before the wire cools, and without subjecting it to undue strain.

[Printed, 6*d*.]

A.D. 1859, February 15.—N° 418.

MUSHET, Robert.—" Improvements in the manufacture of " steel, iron, and cast steel." Cast iron, wholly or partially

decarbonized by the action of currents of air passed through it, when poured into moulds affords a steel or steel-iron, that is in some cases incapable of being hammered or rolled, and in others exhibits, when hammered or rolled, cracks, flaws, and other defects. To remedy these defects from 5 to 30 parts, by weight, of welding cast steel are added in a molten state to about 100 parts of the said partially or wholly decarbonized iron also while in a molten state, at or near the conclusion of the decarbonizing process. The mixture is then well stirred.

The kind of welding, cast steel preferred, is obtained by melting about 20 lbs. of a mild or soft steel in a melting pot, and adding thereto from 2 to 5 lbs. of the "triple compound," composed of iron, carbon, and manganese, by preference that known as "spiegel eisen." (See Patent, No. 134, p. 409.)

If a greater proportion of "triple compound" be added a harder steel will result.

[Printed, *4d.*]

A.D. 1859, February 15.—N° 419.

WALLERS, FREDERICK.—"The application of the waste heat "from puddling furnaces."—*Provisional protection only.* The provisional specification describes, with the aid of drawings, a puddling furnace, with a converting furnace attached to it, which is to be worked with the waste heat from the puddling furnace.

Suitable flues, with dampers for regulating the heat, connect the two furnaces. The converting furnace may contain any number of pots, and be connected with several puddling furnaces.

[Printed, *8d.*]

A.D. 1859, February 16.—N° 425.

CRAWFORD, MATTHEW.—"An improved anti-fouling metallic "varnish, applicable to ships' bottoms, and other similar pur-"poses."—*Provisional protection only.* The metallic varnish is to be made by mixing plumbago or black lead fine, or gum varnish, arsenic, and spirits of wine, in such proportions "as "may be found best by experience."

[Printed, *3d.*]

A.D. 1859, February 16.—N° 438.

BENSON, John Solmons.—" A new or improved method of " silvering glass." — (*A communication from M. Morisson, of Hamburgh.)—Provisional protection only.* A solution of nitrate of silver and tartrate of ammonia is to be employed.

Nitrate of silver is dissolved in 5 times its weight of distilled water, the solution is diluted with 16 times its volume of distilled water. Tartrate of ammonia is then added, in the proportion of ½ oz. of the tartrate to every pound of nitrate of silver in the solution.

The glass is cleaned and heated on a plate of cast iron, by steam or otherwise, the solution being previously poured upon it. The heat gradually evaporates the water, and when evaporated, a deposit of brilliant metallic silver is firmly attached to the face of the glass.

[Printed, 3*d.*]

A.D. 1859, February 17.—N° 445.

FRAISSINET, Pierre Edouard.—" A new or improved " structure of iron, applicable for paving, flooring, bridges, " gratings, girders, and other like purposes." Strips of hoop or other iron are combined, by rivetting between each pair of flat strips, an undulating strip, the strips being set upon their edges, as shown in the drawings.

When it is required the open parts of the structure can be filled in with cement, concrete, wood, or other suitable substances.

[Printed, 5*d.*]

A.D. 1859, February 17.—N° 447.

EMERSON, Frederick William.—" Improvements in the " treatment of certain ores of lead, &c." Ores of lead which contain " chlorine, phosphoric acid, carbonic acid, arsenious or " arsenic acid, sulphuric acid," or their mixtures, are first tested by analysis. The ores are then placed in a suitable wooden or slate vessel, and mixed with an equivalent quantity (by preference slightly in excess) of caustic alkali or alkaline earths, by preference caustic soda. Hot or cold water is added, and the

mixture is treated with jets of steam to keep it to the boiling point, until the acids are extracted. If the extracted acid be in an insoluble form, it is separated "from the resulting lead oxide "with water, according to the specific gravities" of the extracted substances.

If it be in a soluble form, it is separated by a decantation process.

The resulting lead oxide is washed, and then mixed with suitable acids, and converted into various salts of lead in the usual way.

[Printed, 4*d.*]

A.D. 1859, February 18.—N° 453.

WALLIS, George.—"A new or improved method of engraving "applicable to the production of printing surfaces, and the orna-"mentation of metallic and other surfaces."—*Provisional protection only.* A drawing is made or a print taken on paper from an engraved surface, with ink containing gum arabic, or other adhesive substance. Emery powder, sand, or other hard material in powder is applied to the adhesive ink, and causes the lines of the drawing or print to stand out in relief. The paper is placed between two metal plates, by preference the one at the back is made of hard metal, the other of soft; both plates, with the paper between, are passed between rollers, and the drawing or print is impressed upon the surface of the soft metal, and from the impression so made copies may be printed off. If a soft metal roller be required to be engraved for printing fabrics, the drawing is passed between it and a hard roller.

[Printed, 3*d.*]

A.D. 1859, February 19.—N° 461.

CLAY, William.—"Improvements in the manufacture of deck "and other beams," &c. of puddled steel. Puddled steel is rolled, cut into bars of suitable lengths and forms, and piled in such a manner that there may be few external joints. The outer bars are in the form of L L. Some of the bars may be of steel, some of iron.

The pile is heated, then rolled by shaping rollers into such angular or trough shaped, or other forms, as may be required.

[Printed, 8*d.*]

A.D. 1859, February 24.—N° 500.

MUSHET, Robert.—"A new metallic compound or alloy." An alloy of tungsten, iron, and manganese is formed by reducing wolfram ores in a close furnace. The ores are broken small, and placed with charcoal in alternate layers in a furnace, a charge of from 5 to 7 tons should be maintained at a white heat for about 72 hours. Of pulverised or dust wolfram ores, 100 lbs. may be mixed with 20 to 25 lbs. of charcoal dust, and heated between layers of charcoal. An artificial mixture formed of tungsten, 70 parts, iron 15 parts, and manganese 8 parts, may be used instead of the wolfram ores to produce the required alloy.

[Printed, 4*d*.]

A.D. 1859, February 24.—N° 501.

MUSHET, Robert.—"An improvement in the manufacture of "cast steel." Of the metallic compound or alloy of tungsten iron and manganese, prepared as described (see Patent N° 500) 8 oz. are mixed with about 40 lbs. of blister steel and melted in a pot. The compound may be previously combined with twice its weight of pitch.

Secondly with 40 lbs. of good charcoal bar iron such as Swedish, from 6 to 8 oz. of charcoal and 1 lb. of the said metallic compound are melted in a melting pot.

Cast steel is thus obtained, whose hardness is increased by increasing the proportion of the alloy.

[Printed, 4*d*.]

A.D. 1859, February 25.—N° 511.

HINDE, Thomas Callender and HINDE, George James.—"Improvements in coating iron with copper or alloys of copper." The iron surfaces are first coated with tin, or zinc, or lead, or their alloys, and then dipped in a bath of molten copper, or its alloys. They are then placed in a closed annealing pan, with charcoal, and are annealed in the ordinary muffle, by which process the surfaces are smoothed, or charcoal may be heated in a crucible nearly to the melting point of copper, and the coated surfaces may be dipped therein for about 15 minutes, or the coated articles may be dipped in a bath of molten vitreous mixture,

composed of nine parts of borax, three of common window glass, or eight parts borax and three parts flint glass.

Bars so coated may be rolled, and coated wire may be drawn.

[Printed, 4d.]

A.D. 1859, March 2.—N° 553.

HARKER, John William, and FIELD, John Kingsford.—"Improvements in coating the bottoms of iron and other ships "and vessels." About 75 lbs. of oxide of lead, or other metallic oxide, are boiled with 100 lbs. of oil or melted fat mixed with a like quantity of water. The resulting soapy material is applied hot to ships bottoms. Fats and oils may be treated with currents of deutoxide of nitrogen till they become of the consistency of beeswax may be applied as coating to ships bottoms, or nitrate of mercury prepared in the cold "may be made use of, as this "substance contains deutoxide of nitrogen in solution."

[Printed, 3d.]

A.D. 1859, March 7.—N° 594.

GOSSAGE, William.—"Improvements in the treatment of "certain ores of copper for the extraction of metals therefrom." The residuum left after sulphureous coppery pyrites are burned in the process of manufacturing sulphuric acid, contains a large quantity of sulphur combined with iron, a small quantity combined with copper, and sometimes a small quantity of silver.

This residuum is ground, and treated with hot water to extract the sulphate of copper. The undissolved portion is treated with a hot solution of a per-salt of iron (by preference per-sulphate) with or without a small quantity of sulphuric or muriatic acid. The copper is thereby dissolved, and is abstracted by lixiviation with water.

The residuum containing peroxide of iron may be smelted.

The per-salt of iron employed in the above process is converted into a proto-salt. This, by causing it to absorb oxygen from the air, is reconverted into a per-salt, and again used. If the residuum contain silver common salt is added to the solution, whereby silver is extracted in the state of chloride. The solutions of per-salts of iron obtained from copper mines, or heaps of pyrites exposed air and water, called "mine waters," may be used instead of the above-described solutions.

Copper may be precipitated from solutions containing it by using the metallic iron or proto-sulphuret of iron obtained from the residuum above-mentioned.

[Printed, 4*d.*]

A.D. 1859, March 9.—N° 619.

FISHER, HENRY.—" Improvements in machinery or apparatus " for cutting thin sheets of metal into strips, and for tempering " sheets or strips of metal."—*Provisional protection only.* Rollers are proposed to be used for pressing the surfaces of the metals while they are being cut. A roller having projecting rings fitting into corresponding spaces in another roller may be used.

Rollers are also to be used for keeping strips of metal in a state of tension while they are being tempered.

[Printed, 3*d.*]

A.D. 1859, March 10.—N° 623.

LODGE, HENRY. —" Improved means of protecting ships, " batteries, and other constructions or buildings from the effects " of projectiles of various kinds." Thin sheets of metals are combined in layers in a corrugated form. The outer sheet may be of copper, yellow metal, or other alloy to resist the effects of water. Sheets of iron and steel may be combined in alternate layers, and sheets of elastic material, as india rubber, may be interposed. Felt, asphalte in sheets, or any suitable elastic materials may be placed between or behind the sheets of metal.

[Printed, 7*d.*]

A.D. 1859, March 14.—N° 646.

SMITH, EDWARD.—" Improvements in treating or preparing furnaces used in the manufacture of iron."—*Provisional protection only.* Pebbles or flints, when calcined and pulverised, are to be used as a mortar for lining furnaces. Slags, pulverised and made into bricks, may be used for lining furnaces.

[Printed, 3*d.*]

A.D. 1859, March 17.—N° 681.

WARNER, ARTHUR, and TOOTH, WILLIAM HENRY.—" Im- " provements in the manufacture of iron." Pig iron is melted in a reverberatory furnace, in the presence of hydrogen, carburetted

hydrogen, nitrogen, nitrous acid, nitric acid or cyanogen gas obtained by any suitable apparatus and means. The gas is injected into the furnace, and atmospheric air is excluded as much as possible. The gases may be generated by supplying jets or streams of coal tar or pitch to the fuel. The iron is afterwards puddled in the presence of the gas, atmospheric air being excluded.

To separate sulphur and phosphorus from the iron, salts of ammonia in a state of powder are put in the ladle or vessel into which the iron is run, about 1 lb. to 1 ton of iron.

To separate silica ½ lb. of carbonate of potash, soda, or othe alkali is added to the ammonia.

[Printed, 3*d.*]

A.D. 1859, March 18.—N° 690.

MUSHET, ROBERT.—" A new or improved metallic alloy." An alloy of tungsten, iron, and maganese, is made by mixed about 9 lbs of deoxydised ores of tungsten by preference, wolfram ores with about 36 lbs. of a " triple compound " of iron, carbon, and maganese, by preference " spiegel eisen." (See *ante*, Patent, N^os^. 134, 500.) The substances are granulated and melted in the ordinary melting pot.

[Printed, 4*d.*]

A.D. 1859, March 18.—N° 691.

MUSHET, ROBERT.—" An improvement in the manufacture of " cast steel." An alloy of tungsten, iron, and maganese, prepared as described (*see ante*, Patent, N° 500, p. 419,) is added, in a molten state, to iron which has been decarbonized, or nearly so, by passing currents of air through it in a molten state. The proportions may be varied; from 2 to 15 parts of alloy of tungsten may be used with 100 parts of decarbonized iron and will give the various qualities of steel required in commerce.

[Printed, 4*d.*]

A.D. 1859, March 19.—N° 697.

BENSON, EDMUND LEOPOLD. — " An improvement in the " casting of steel."—(*A communication from Ewald Riepe, of Pau, France.*)—*Provisional protection only.* In order to prevent honey-

combs and bubbles from being formed in cast steel, it is proposed to run the steel into moulds previously heated. Different degrees of heat are said to be required for hard and soft steels.

[Printed, 3*d.*]

A.D. 1859, March.—N° 703.

MUSHET, ROBERT.—" An improvement or improvements in the " manufacture of cast steel." Cast steel is alloyed with the metal titanium. The ores of titanium, or titanic acid, when pulverised are mixed with from 1 to 2 parts of carbonacecus matter, as melted pitch; the mixture is cooled on a slab, and then broken up. From 4oz. to 1lb. of the mixture are added to 40lbs. of blister steel, and melted therewith in the melting pot, increased proportions will give increased hardness. Various ores of titanium may be used, schlormite or iserine being preferred.

[Printed, 4*d.*]

A.D. 1859, March 21.—N° 707.

HAGGETT, WILLIAM.—" An improved method of treating " metals and other materials to increase their strength." Plates or sheets of metal are formed, by pressing, rolling, or casting, with undulated surfaces, composed of longitudinal and transverse corrugations, crossing one another diagonally.

[Printed, 6*d.*]

A.D. 1859, March 21.—N° 710.

WHITTAKER, ROBERT.—" Improvements in the manufacture " or construction of metallic rollers or cylinders and mandrells for " printing."—*Provisional protection only.* Copper printing rollers are proposed to be made of thin shells of copper, which are supported internally by three cylinders, or tubular pieces of metal. The cylinders are turned, and suitable apparatus is described for screwing them together.

[Printed, 3*d.*]

A.D. 1859, March 23.—N° 744.

JOHNSON, JOHN HENRY.—" Improvements in machinery or " apparatus for the manufacture of sheet iron."—(*A communication from M. Masson, Paris.*) The specification and drawings describe

apparatus for making sheet tin plates, in which one or more vessels attached to an endless chain or band are employed for receiving the melted tin. The tin is spread upon an elastic body or surface, such as cloth, stretched by the pressure of the receiving vessels against it.

[Printed, 6*d*.]

A.D. 1859, March 24.—N° 752.

SANDERSON, CHARLES. — "Improvements in preparing, " tempering, and covering or coating thin strips or sheets of steel." Sheets or strips of steel intended for crinoline steel are tempered in the piece as they come from the cold rolling mill, being about 2½ to 3½ inches wide, 50 to 80 feet long, and from No. 28 to No. 32, wire gauge, in thickness. The strips are coiled with a piece of wire interposed to keep the coils apart, and are dipped in oil and heated in an oven at a low red heat. A spindle is then passed through the centre of the coil, the strip is unwound, and is gradually passed between a pair of metal dies, kept at a red heat, and is thereby tempered and made flat. The steel strips are then cut, and cleansed and pickled. They may be afterwards coated with copper, zinc, silver, or other metals or their alloys, to prevent the steel from oxydising.

[Printed, 3*d*.]

A.D. 1859, March 26.—N° 768.

MUIR, MATTHEW ANDREW, and McILWHAM, JAMES.— " Improvements in moulding or shaping metals." The specification and drawings describe moulding apparatus, in which a traversing sling and suspension rods, adjustable as to their combined operating length, are used for transferring the mould bo[illegible] A "duplex action lever connected to a pendent hooked link" used for working "the draw of the pattern." A suitable heating box is used for heating when required the pattern plate and pattern for forming the lower. The mould box and pattern plate are connected and disconnected by means of "pendulous weighted catches," and the pattern withdrawn by special drawing or lifting apparatus.

[Printed, 1*s*. 9*d*.]

A.D. 1859, March 28.—N° 775.

NEWTON, Alfred Vincent.—" An improved construction of " furnace for re-heating steel preparatory to the hardening, tem- " pering, or annealing process."—(*A communication from P. G. Gardiner, New York.*)—*Provisional protection only.* It is proposed to construct a furnace having a closed oven or heating chamber, upon which the heat and flames are made to act on all sides; but the metal in the heating chamber is prevented from being in contact with the flames or gases of combustion, and as little as possible with the external atmosphere.

[Printed, 3*d.*]

A.D. 1859, March 28.—N° 777.

NEWTON, Alfred Vincent. — "Improved apparatus for " retaining the oil or other fluid used for annealing, tempering, and " hardening steel at an equable low temperature."—(*A communication from P. G. Gardiner, New York.*)—*Provisional protection only.* Two large cylindrical tanks are proposed to be used for receiving the oil, they are connected by a pipe, and are placed side by side, so that the fluid may run from one into the other. A worm or coil of pipe is placed in each vessel, by means of which the oil, when heated by hot steel being dipped therein, is afterwards cooled by a stream of cold water made to circulate through the worm.

[Printed, 3*d.*]

A.D. 1859, April 2.—N° 826.

BESSEMER, Anthony.—" Improvements in furnaces to be " employed in the manufacture of iron and steel."—*Provisional protection only.* It is proposed to make the furnace with a portion of the bed or bottom upraised, and by means of suitable apparatus to give to it a rocking or up-and-down motion, so as to agitate the iron and cause decarbonization.

[Printed, 3*d.*]

A.D. 1859, April 2.—N° 832.

COUPLAND, Michael.—" Improvements in furnaces." Furnaces are made with moveable fire bars, which are raised as the

fuel is burned. Instead of hand mechanism being used for raising or lowering the bars, suitable self-acting hydraulic apparatus or apparatus worked by steam is described with the aid of drawings.

[Printed, 10*d.*]

A.D. 1859, April 4.—N° 835.

POTTS, Ferdinand, and BROUGH, Robert.—" Certain im-" provements in the manufacture of calico printing rollers, &c., and " other metallic tubes, and the rolling of the metal for the same or " other purposes."—*Provisional protection only.* A taper tube is to be formed of sheet iron upon a true mandril, a coating of iron is cast upon the tube and turned truly.

A billet or seamless tube of copper is placed on the cylinder so formed and rolled so as to cover the cylinder with the copper tube or case.

[Printed, 3*d.*]

A.D. 1859, April 4.—N° 846.

MOREWOOD, Edmund.—" Improvements in coating metals." Sheets of iron, copper, or other metals are coated with tin, lead, zinc, or other metals, or their alloys, by passing them between rollers, the same being so arranged that the jaws or opening through which the sheets pass are, or is immersed, considerably below the surface of the molten metal. By placing a bar across the pot, descending into the bath of metal, the sheets are made to pass through a suitable flux, as sal ammoniac, on the surface of the ingoing side, and pass out on the exit side, either through no flux, or a different material, as sand or whitening.

[Printed, 7*d.*]

A.D. 1859, April 5.—N° 848.

SHANKS, Andrew.—" Certain improvements in machinery for " forging and stamping metal." The specification and drawings describe a steam hammer, in which a rotatory motion is employed instead of the ordinary cams and levers for working the valve or valves. Two extra valves are used to regulate independently the pressure of the steam on both sides of the hammer. The

piston rod is made of an elliptical shape, to prevent its turning round in the cylinder. An elastic buffer is placed in the cylinder for the piston to strike against.

[Printed, 6*d.*]

A.D. 1859, April 5.—N° 851.

BRIERLEY, Leonard, and GEERING, Henry.—"A new or "improved method of ornamenting metallic articles, &c." Designs either plain, coloured, gilt, or bronzed, are made upon paper, and are applied to the articles by means of glue-paste, or other suitable adhesive material, which will bear heat. The surfaces are then varnished with hard varnish, and stoved in the usual way.

[Printed, 3*d.*]

A.D. 1859, April 8.—N° 883.

HENDERSON, William.—"Improvements in treating certain "ores, and in obtaining products therefrom." These relate to methods of treating zinc, or other ores containing zinc, ores of antimony containing lead, copper ores, ores containing cobalt, gold and silver ores, and lead ores.

Zinc ores which contain much iron are calcined with salt. The calcined ores are crushed, and treated in vats as described in the specification of former Letters Patent. (See *ante* N° 2517. A.D. 1857, p. 353).

Ores of antimony are also calcined with salt in closed chambers, the antimony in a state of chloride is passed into suitable flues, or a tower containing coke or pebbles wet with water, where the sublimed chlorides are condensed, and afterwards treated in the usual way.

Copper ores may be similarly calcined, and treated with acids, and precipitated by means of iron or sulphuretted hydrogen.

In treating cobalt ores the cobalt is separated from chloride of iron liquors, by evaporating the neutral solutions to dryness, and decomposing the residue by heat and steam, or jets of water.

Gold ores containing other metals, as iron and copper pyrites are calcined to form a regulus or matt in the usual way, two parts of anhydrous sulphate of soda (salt-cake), are then mixed therewith, and heated in a furnace. The metallic product obtained is cast in the form of pigs, and thrown while hot into

water, and so disintegrated. Sulphuret of sodium will dissolve out, holding in solution sulphuret of gold. Gold is extracted by means of acids.

A process of treating ores containing silver is described, in which the ores are calcined with salt.

Quartz ores are crushed and treated with an aqueous solution of chlorine.

Lead and other ores are crushed dry, by means of rolls just fine enough to release the particles of ore from their matrices. This may be best done by crushing them a little too coarsely, and sifting the ore in a sieve having meshes of exactly the required size, and again crushing the particles that are too large.

The crushed ores are then ground in a mill, whose stones are set at such a distance apart as not to grind the particles of ore, but to rub together the crushed matrices. The ground ores are then sifted through a series of sieves of the requisite fineness, the first being the finest.

[Printed, 6*d.*]

A.D. 1859, April 12.—N° 915.

NEWTON, WILLIAM EDWARD.—"Improvements in the manu- "facture of iron."—(*A communication.*)—*Provisional protection only.* In order to enable iron to be refined in the blast furnace it is proposed to introduce the blast more in the centre of the hearth, at a point removed from its side walls. The refining pipe which is usually injured by the heat is renewed at each heat. The pipe is composed of two parts, and is connected with a blast chamber, fixed at some convenient part of the furnace. The pipe is pushed down at an angle of about 90 degrees, through the fluid cinder nearly to the bottom of the liquid iron in the hearth.

[Printed, 3*d.*]

A.D. 1859, April 13th.—N° 933.

HUGHES, JOHN, WILLIAMS, WILLIAM, and LEYSHON, GEORGE.—"Improvements in the manufacture of tin and terne "plates." In manufacturing tin and terne plates, the plates after being dipped in a bath of molten metal, "the tinman's pot," are transferred to another pot also containing molten metal, called the "washman's pot," where their surfaces are brushed over to remove the superfluous metal. Then, instead of putting the plates

in a pot of grease, they are put in a rack contained in another pot of hot metal; the rack when full is raised slowly and steadily, the superfluous metal runs off, and when the plates are cooled, which they are allowed to do in the rack, they are finished.

[Printed, 1s. 4d.]

A.D. 1859, April 14.—N° 943.

McDOUGALL, Alexander. — " Improvements in coating " metallic surfaces." For coating pipes of lead and other metallic surfaces a mixture is used, composed of 1 part, by weight, of sulphur dissolved in 2 parts of heavy oil of tar or " other solvent " of sulphur, such as spirits of turpentine or resin oil." In the solution of sulphur are dissolved 5 parts, by weight, of pitch or asphaltum, and to this mixture are added 5 parts of bees' wax to 100 parts of the bituminous mixture first described. The mixture is applied at boiling heat, the metal being heated to about 400° Fahr.

[Printed, 3d.]

A.D. 1859, April 15.—N° 948.

CHAPMAN, John.—" An improvement or improvements in the " manufacture of angle iron." To give a smooth clean surface to angle iron it is, after being manufactured in the ordinary way up to the last stage, passed between " hard smooth moulding and " planishing rolls," such as are described and shown in the drawings. Three moulding and two planishing rolls are used by preference. In the front of the rolls two scrapers are placed, which scrape both the inner and outer surfaces of the iron before it is passed between the rolls. Cleaners or scrapers, made of wrought or cast iron or steel, or other metal or alloy or wood, are fixed over the planishing rolls; these keep the grooves clean and bright.

[Printed, 7d.]

A.D. 1859, April 16.—N° 956.

CLARK, William.—" Improvements in apparatus for separa" ting metals from their ores and other matters."—(*A communication from M. M. Toussaint and Langlois, of Paris.*)

The separation is effected in three ways, by

1st, Chloruration; 2nd, the application of a column of water; and 3rd, by amalgamation.

1st. The specification and drawings describe a closed receptacle in which the ores are placed; a vacuum is made by a suitable pump, and chlorine is then introduced and permeates and saturates the ores "until the chloruration is complete." The metallic chlorides are afterwards treated in the usual way.

2nd. Auriferous and argentiferous sands are treated with water in washing apparatus, which separates and sorts the substances according to their respective specific gravities.

3rd. In the amalgamating process the crushed and washed ores are placed in a closed receptacle which contains heated mercury. The ores are forced down into the mercury by the action of a screw.

[Printed, 1*s*.].

A.D. 1859, April 16.—N° 957.

NEWTON, William Edward.—"Improvements in the manu-"facture of alumina."—*A communication.* The specification describes many modes of precipitating alumina, pure or in combination with other substances, from its solutions in alkalies, by treating them with carbonic acid in various forms, and other acids and chlorides, and other metallic salts. The alumina thus obtained may be used in the manufacture of aluminium and for other purposes.

[Printed, 5*d*.]

A.D. 1859, April 16.—N° 959.

COURAGE, Alfred.—"An improved method of obtaining the "metallic particles contained in fumes or vapours from lead and "other smelting works." Steam is introduced into the flue or flues communicating with the various furnaces, which mixing with the fumes, causes them to deposit the metallic particles which they may contain. The steam is generated in tanks or boilers so placed as to be heated by the waste heat from the furnaces.

[Printed, 3*d*.]

A.D. 1859, April 16.—N°. 962.

VIVIAN, Henry Hussey. — "Improvements in smelting "copper."—*Provisional protection only*. The ores are proposed to be calcined so far that when smelted they will produce a rich regulus, containing about 70 per cent. of copper, instead of the ordinary regulus which contains about 33 per cent. of copper. The slags produced in the smelting process will be rich in copper, and are again smelted in a blast furnace, the coals and cinders which fall through the bars of the calcining and smelting furnaces, are used up in the blast furnace. The red and coppery slags produced in smelting copper, and also ores of copper which do not contain sulphur are reduced in the blast furnace, and afford metallic copper instead of regulus.

[Printed, 3*d*.]

A.D. 1859, April 20.—N°. 993.

WOTTON, Job.—"An improvement or improvements in raising "or shaping metals." Vessels are made in a globular form from sheets of copper, brass, german silver or other metals or alloys. A sheet of a rectangular shape is bent up into a cylindrical form, and its edges soldered or brazed; a core of similar shape is placed inside, and some soft metal or alloy, such as lead and tin is run in and forms a lining to the cylinder formed as described. The cylinder is then subjected to the action of dies and pressed into the required shape.

[Printed, 7*d*.]

A.D. 1859, April 29.—N° 1076.

CORBELL, William and CARMONT, William.—"Certain "improvements in the construction and arrangement of furnaces "employed in the manufacture of iron and steel, and for other "similar purposes." A brick-work shield is placed over the metal hearth of the furnace, to prevent deleterious contact between the gases of combustion, or solid matters, as coke and the iron operated upon. A partition is placed between two metal hearths, both of which are heated from one furnace for greater convenience in the process of converting the iron.

A hopper connected with self-acting feeding apparatus is used for supplying the requisite "physic" to the furnace."

[Printed, 6*d*.]

A.D. 1859, April 30.—N° 1084.

DARLINGTON, John.—" Improvements in zinc retort furnaces." The specification describes with the aid of drawings zinc retorts placed in close furnace or chamber, by preference, the Belgian or Liège cylindrical pot furnace. The retorts are heated by means of a fire-place so arranged that the fuel employed is rendered incandescent, either by means of a blast of cold air, or by air previously heated and not by a natural draught. The coal used is caked or coked during its passage into the fire-place, the slags, clinkers, or ashes with or without fluxes made to flow through a tap hole, are withdrawn through suitable openings having air-tight doors.

[Printed, 6*d.*]

A.D. 1859, May 3.—N° 1115.

MUSHET, Robert.—" An improvement in the manufacture of " cast steel." Cast steel is made by melting pieces of malleable iron (about 40lbs.), with from 2 oz. to 1lb. of a compound of pulverized titanium ore mixed with pitch, about 20lbs. of pitch being melted with 10 to 20lbs. of pulverized ore to form the compound. Charcoal may be also added, 4 oz. will give a soft steel, 12 oz. a very hard steel. The pots usually used by makers of cast steel may be employed. The ores of titanium used by preference are iserine, containing 10 per cent. of titanic acid and 86 per cent. of oxides of iron and ilmenite containing equal proportions of titanic acid and oxide of iron. The ores may be deoxydized in a close chamber with carbonaceous matters and then be pulverized. Oxide of manganese may also be used.

[Printed, 4*d.*]

A.D. 1859, May 4.—N°. 1117.

VASSEROT, Charles Feéderic.—" An improved form of " tuyere for blast furnaces."—(*A communication from M. Bierlein, of Bas-Rhin, France.*)—*Provisional protection only.* A box or reservoir of cast-iron is used having two elbow pipes, and an opening to receive a cap of cast-iron, in which is an aperture communicating with the furnace. One elbow pipe is connected with the bellows or fan, the other passes vertically through the arched masonry into the furnace.

[Printed, 3*d.*]

A.D. 1859, May 5.—N° 1128.

HUGHES, EDWARD THOMAS.—"Improvements in the manu-" facture of sheet iron."—(*A communication from David Morris, of Pittsburgh, U.S.*)—*Provisional Protection only.* The article known as "polished Russia sheet iron," is to be made from charcoal cold blast pig iron, purified in a refining or puddling furnace. The iron is hammered and rolled into sheets; the sheets are then passed through "etched or mottled rollers to improve their " appearance, then heated and hammered one or more times, then " annealed in an air-tight case."

[Printed, 3*d.*]

A.D. 1859, May 7.—N° 1150.

MUSHET, ROBERT.—"Improvements in puddling iron and " steel." Ores of titanium by preference "Iserine" (see *ante*, Patent, N° 1,115, p. 432), are mixed with the iron, either in a pulverised state or combined with about equal weights of pitch or tar.

From 10 to 20 per cent. of the pulverised ores of titanium may be stirred in with the iron during the puddling process. 1 lb. of oxide of manganese may be combined with from 2 to 10 lbs. of the ores of titanium.

[Printed, 4*d.*]

A.D. 1859, May 7.—N° 1151.

MUSHET, ROBERT.—"Improvements in the manufacture of " iron." From 1 to 10 or 20 per cent. of the ores of titanium, titanic acid, or titaniferous iron ores, previously deoxydised, and sometimes pulverised, are added to the furnace charge or burden, when melted in the blast furnace to produce cast iron.

The titanium alloyed with the iron improves its quality.

The titaniferous ores may be combined with pitch (see *ante*, Patent, N° 1115, p. 432). When pig or cast iron is melted in the refinery furnace, 2 to 30 lbs. of the compound of the ores mixed with pitch may be added to the iron.

[Printed, 4*d.*]

A.D. 1859, May 7.—N° 1154.

GEDGE, William Edward.—" Improvements in the manu-" facture of steel."—(*A communication from C. J. Perinel, of Fourvoiry, France.*) In the puddling process, instead of coal, wood that has been well dried but not carbonised is employed as fuel. A puddling furnace is described with the aid of drawings. A separate gas generator may be used; it is connected with one or more puddling furnaces by means of suitable pipes.

[Printed, 9*d.*]

A.D. 1859, May 10.—N° 1171.

NORMAN, John.—" Improvements in furnaces." The specification describes, with the aid of drawings, furnaces constructed especially with the view of consuming smoke and all products of combustion. This is done by forming in the bridge and sides of the furnace, and communicating with the ash pit suitable passages, so that air is mixed with the hotter part of the fire gases, and this mixture again subsequently mixed with the remainder of the fire gases.

[Printed, 9*d.*]

A.D. 1859, May 13.—N° 1198.

ALLENDER, Joseph Felix, and RICHARDS, Job.—" Im-" provements in furnaces for puddling iron."—*Provisional Protection only.* It is proposed to construct the puddling furnace in two parts; one vertical, the other horizontal. The vertical part carries the fire place, it turns on a horizontal axis. The horizontal part forms the bed of the furnace, in which the iron is puddled. The end of the horizontal limb is connected with a crank or face plate, by means of which motion is to be given to the furnace, and the iron agitated during the puddling process.

[Printed, 3*d.*]

A.D. 1859, May 11.—N° 1215.

ADAMS, Edward.—" The employment of machinery for drawing " or extracting the gas, flame, or smoke from furnaces, and " forcing the same into them, or into the cupola to be used as

" blast or fuel for melting iron or mines of any description.";—*Provisional Protection only.* Machinery, of which no description is given, is to be used for drawing off "the gases, flame, or " smoke from furnaces," and forcing them into the furnace or a cupola to be used as " blast or fuel for " melting iron or mines of " any description.",

[Printed, 3*d.*]

A.D. 1859, May 20.—N° 1245.

LEACH, ROBERT VALENTINE.—" Improvements in the manu-" facture of iron, and in the machinery connected therewith."—*Provisional Protection only.* It is proposed to employ a series of pairs of rolls, and in connexion with one another; the iron being delivered as required from one pair to the next.

In mills used for "cold rolling," the "black plates" used in the manufacture of tin or terne plates, a box or hopper is used in which the plates are, by self-acting apparatus, conveyed one by one to the rolling mill.

[Printed, 3*d.*]

A.D. 1859, May 20.—N° 1246.

KIRKALDY, DAVID.—" Improvements in the manufacture or " treatment of steel."—*Provisional Protection only.* To give increased strength to steel of various kinds, including "homogenous metal," the steel when in a heated state is to be immersed in, or treated with fatty or oily substances or mixtures, such as " organic oils, mineral oils, butters, or tallows, or a resinous " bituminous or tarry substance or mixture."

[Printed, 3*d.*]

A.D. 1859, May 20.—N°. 1247.

JOHNSON, JOHN HENRY.—" Improvements in the roasting " or calcining of ores, applicable also to the oxidising or other " substances.—(*A communication from J. F. Persoz, Paris.*) Ores are calcined and desulphurized in a furnace so constructed that the fumes and products of combustion are drawn off and collected by means of an exhaust and force pump, which is suitably

constructed of cast iron and vulcanized india rubber to withstand heat and corrosive fumes. The use of a chimney is dispensed with, none of the fumes being allowed to escape into the air.

[Printed, 4*d*.]

A.D. 1859, May 20.—N° 1250.

BUDD, JAMES PALMER.—"Improvements in the manufacture "of tin and terne plates." In the manufacture of "tin and terne "plates," the plates when prepared are first dipped in a pot of molten metal called the "tinman's pot;" then are passed on to another pot, also containing molten metal called the "washman's "pot," where the superfluous metal is removed. The plates are then deposited, not in a pot containing grease as in the ordinary mode, but in a rack in another pot of melted metal. When the rack is full, instead of lifting the rack with the plates out of the pot, the plates are raised simultaneously by a series of nippers made to open and shut by suitable apparatus, which is described with drawings, the rack is allowed to remain."

[Printed, 1*s*. 1*d*.]

A.D. 1859, May 23.—N° 1262.

LEACH, ROBERT VALENTINE, and WILLETT, THOMAS WILLIAM.—"Improvements in the manufacture of tin plates and "terne or leaded plates, and in the apparatus connected there- "with." Instead of dipping tin or terne plates in the "wash pot," and grease-pot by hand, as in the ordinary way, the plates are to be placed in a rack, actuated by self-acting mechanical means, such as a lever worked by a suitable cam, so that the plates are dipped simultaneously, receive a like weight of coating, and are all withdrawn together at a speed which may be regulated so as to allow the superfluous coatings to drain off.

The wash-pot may be so made as to allow a depth of grease to remain above the molten metal, and answer as a grease pot.

To insure an equal distribution of the coating metal, the plates may be placed horizontally in a rack, which is immersed in the grease pot, and then is made to rotate so as to distribute the coating by its centrifugal action. For commoner descriptions of plates the rotating movement is dispensed with. To effect "an "even and accurate listing," a flat metal plate, by preference

copper smooth and tinned, is used; it is inclined at an angle of about 30°, and heated by a suitable flue. The plates are arranged in a suitable rack, the edges to be listed rest on the copper plate, and as they are heated the superfluous metal runs off.

[Printed, *4d.*]

A.D. 1859, May 23.—N° 1273.

BARCLAY, ANDREW.—" Improvements in steam hammers."—*Provisional Protection only*. It is proposed to work " mechanical " hammers of the tilt or lever class," technically called " olivers," by steam power, instead of manual or pedal power as is the usual mode.

A small vertical steam cylinder may be fitted up alongside the anvil beneath, and connected with the hammer lever, which is overhead. An overhead lifting spring may be used for raising the hammer after each blow, quick and powerful strokes may be thus given.

[Printed, *3d.*]

A.D. 1859, May 26.—N° 1305.

NEVILL, WILLIAM HENRY.—" Improvements in the manufac- " ture of steel and wrought iron." The iron is decarbonized by pouring it when in a molten state from an orifice about 15 feet from the floor on which it falls. The stream of molten iron is made to fall upon a cone about 18 inches in diameter at the base, nine inches high, and raised on a stand about 3 feet 6 inches from the floor, the iron thereby divided into streams, and is exposed to the action of the atmosphere, and so purified.

[Printed, *3d.*]

A.D. 1859, May 30.—N° 1329.

GOSSAGE, WILLIAM.—" Improvements in the manufacture of " iron and steel." Native compounds of iron with sulphur, such as pyrites or sulphurets of iron are used in the production of sulphuric acid, and give a residual product after the process of combustion, which is chiefly oxide of iron, contaminated with some sulphuret of iron; this is subjected to the action of air

at a high temperature, the sulphur is expelled, and the oxide so purified may be used in the manufacture of iron and steel by the ordinary processes.

Suitable furnaces are described, with the aid of drawings, for driving off and collecting the sulphur.

[Printed, 10*d.*]

A.D. 1859, June 3.—N° 1365.

MUSHET, Robert.—" An improvement or improvements in " the manufacture of iron and steel." An alloy of iron carbon and manganese, by preference the triple compound called " spiegel " eisen," (see *ante*, Patent, N° 134, p. 409), is added to cast and refined iron, when charged into the puddling furnace to be made into malleable iron or steel.

When the iron in the furnace is on the point of passing into granules, from 3 to 15 per cent. of the triple compound, in a molten state, is added to the iron in the puddling furnace and puddled with it.

The melted compound may sometimes be added at an earlier stage.

[Printed, 4*d.*]

A.D. 1859, June 3.—N° 1368.

JOHNSON, John Henry.—" Improvements in reducing solid " substances to powder, and in the machinery or apparatus em- " therein."—(*A communication from W. J. Cantelo, of Burlington, New Jersey, U.S.*) The specification and drawings describe rasping or sawing apparatus intended to be used for reducing to dust or powder substances that cannot be easily ground, such as fibrous substances, gutta-percha, india-rubber.

[Printed, 7*d.*]

A.D. 1859, June 8.—N° 1395.

BERGUE, Charles De.—" Improvements in machinery for " punching and shearing metal." The specification and drawings describe a rocking frame or lever, which in its general shape is like an inverted ⅃ or an L. The rocking frame works on a horizontal axis, placed at the intersection of the vertical and horizontal arms. The punch or shears may be attached in any

convenient way to the end or ends of the horizontal arms, and suitable apparatus is used to give the required oscillating motion to the frame.

A moveable pin or pointer is applied to the punching machine to indicate the required position of the plate to be punched, the pin or pointer being made to coincide with marks previously made on the plate, so that the workman need not watch the punch itself.

[Printed, 1*s*.]

A.D. 1859, June 13.—N° 1422.

BAUGH, Benjamin.—" Certain improvements in apparatus or " machinery for raising metals." Instead of using blows from a hammer for raising the surfaces of soft metals, dead weight or pressure acting more gradually is applied. The specification and drawings describe suitable hydraulic apparatus for giving the required pressure to the dies and matrices.

[Printed, 1*s*. 4*d*.]

A.D. 1859, June 14.—N° 1432.

DIXON, John.—" Improvements in puddling steel."—*Provisional Protection only.* An uniform heat is to be maintained in the puddling furnace, the damper being kept raised until the metal " rises," and the balling process commences. The damper is then closed. Very little scale is required, one or two shovels full being put in at the commencement of the process.

[Printed, 3*d*.]

A.D. 1859, June 16.—N° 1446.

SZERELMEY, Nicholas Charles.—" Improvements in pre-" paring combinations of materials for preventing rust in iron and " other metals, and decay in timber." 1. 4 cwt. of blue argillaceous earth, 6 cwt. of brown stone, 9 cwt. of hydraulic lime, and 2 cwt. of silica are heated and pulverised, and then mixed with 10 cwt. of Krem's white, 5 cwt. of carbonate of lime, 5 cwt. of black ash, 1 cwt. of sulphur, 5 cwt. of red oxide of iron. The ingredients are mixed with lime water to form paste, which is ground and dried by exposure to air.

2. About 1 ton of purified linseed oil, 32 lbs. of litharge, 32 lbs. of lime, 60 lbs. of white copperas, and 40 lbs. burnt umber are

boiled together for about 2 hours. 2 cwt. of pure Egyptian asphalte, and 1 cwt. of American rosin are added, and are boiled until they burst into flame, which is extinguished by covering with a close cover.

3. 156 pounds of pure Egyptian asphalte are boiled in an iron pot, in another are boiled for about 2 hours 1 ton of purified linseed oil and 30 lbs. of litharge. These are mixed and boiled together, and cooled, and 56 lbs. of Krem's white and 60 gallons of Venetian turpentine are afterwards added.

The above compositions are applied with a brush or otherwise to the surfaces of the metals or substances they are intended to preserve.

[Printed, 3*d.*]

A.D. 1859, June 16.—N° 1454.

NEWTON, Alfred Vincent. — "Improvements in casting "cylinders and tubes."—(*A communication from Freeborn Adams, of Somerville, Massachusetts, U. S.*) A cast copper tube or cylinder without blow-holes, "an article of manufacture hitherto unknown," is produced means of moulding apparatus (described with the aid of drawings). A vertical mould is used. It is fitted with a central core, and so arranged that it can be made to rotate on its vertical axis, so that the metal is run in equally all round. The mould is formed in two halves, held by clamps, and secured by pins to a bed mounted on a rotating shaft. Within the mould is a moveable bottom, which is raised or lowered according to the length of the tube or cylinder. Upon this rests the core, which is held by thin metallic straps. The core bar is hollow, and perforated with holes, when used it is coated with moulding sand.

The velocity with which the mould is made to rotate varies with the rapidity with which the metal is poured. About 125 revolutions per minute are found to answer in casting cylinders four inches in diameter.

[Printed, 6*d.*]

A.D. 1859, June 21.—N° 1488.

TOMKINS, George.—" Improvements in coating metals, and " in the apparatus connected therewith."—*Provisional Protection only.* Iron plates are to be coated with tin or other metals or

alloys, by dipping them by means of self-acting apparatus. The plates are held in a series of nippers or clips, or in a rack. Three pots,—the first containing melted resin, the second molten tin, the third molten metal or the wash,—are arranged on a table, above which is the dipping apparatus, which is connected to a cross rod, and has a traversing motion.

The plates are brushed by a double brush as they leave the pots. As the plates leave the washpot they are drawn over a heated polished plate, to which is attached a roller, which removes the superfluous metal, and enables the grease pot to be dispensed with.

[Printed, *3d.*]

A.D. 1859, June 21.—N° 1493.

PARKES, Alexander.—" Improvements in the manufacture of " cylinders and tubes of copper and alloys of copper." In raising discs or blanks of copper and its alloys, the discs are made less in thickness from the centre outwards, by preference, plane on one side and convex on the other. In making cylinders of bent tubes the edges are melted and joined by directing upon them "jets of " hydrogen or oxyhydrogen or coal gas, and hot or cold air under " pressure," they are thus joined without solder.

Various improvements in the modes of drawing and rolling tubes of copper and its alloys are also described.

[Printed, *4d.*]

A.D. 1859, June 22.—N° 1499.

BARCLAY, Andrew.—" Improvements in steam hammers and " pile-driving machines." These relate to apparatus for working tilt or other hammers usually worked by the hands or feet. The apparatus is similar to that before described (see *ante*, Patent N° 1273, p. 437).

[Printed, *2s.*]

A.D. 1859, June 29.—N° 1551.

GRIFFIN, John Joseph.—" Improvements in gas furnaces " suitable for fusing refractory metals." A gas burner consisting of a cylindrical or other suitably shaped metal case is used, it is

closed at the bottom, and has at the top a cover formed of a block of cast iron or other heat resisting material. The case is divided into two compartments, into the upper is admitted the gas, and it issues through holes in the case. Air is forced into the lower compartment, and is conducted from it by tubes, each tube corresponding with a hole in the upper case, so that from each hole issues a jet of gas with a jet of air in its centre. When these jets are inflamed, great heat is produced. The burner is fitted in a hole made in a slab of refractory pottery ware, over this is a perforated cover supporting the crucible, over which is another perforated cover. The space between this and the exterior wall of the furnace is filled, by preference, with small flint stones. The exterior wall of the furnace is formed by rings of refractory pottery, as described with the aid of drawings.

[Printed, 7*d.*]

A.D. 1859, July 1.—N° 1570.

HOWELL, Joseph Bennett.—" Improvements in the treat-" ment of iron."—*Provisional Protection only.* It is proposed to submit iron to the action of heat when the iron is enclosed in the white ashes obtained from burning coal. It is assumed that the impurities are thereby extracted, as the quality of the iron is improved.

[Printed, 3*d.*]

A.D. 1859, July 4.—N° 1591.

BROOMAN, Richard Archibald.—" A cementing powder or " mixture, and process for cementing, converting, refining, " strengthening, and steelifying iron."—(*A communication from Job Johnson, East Brooklyn, New York.*) A cementing powder formed of pure caustic lime, bone dust, and charcoal, by preference oak, pulverized and mixed, is placed with iron, in alternate layers, in a converting furnace. The product is an iron of great rigidity and hardness, which is malleable, and resists oxydation. Steel may also be produced, and the presence of phosporous in the bone dust is said to be advantageous.

[Printed, 4*d.*]

A.D. 1859, July 5.—N° 1597.

NEWTON, William Edward.—" Improved apparatus for " moving iron or other metals while the same is in process of

"manufacture at the rolls." The specification and drawings describe moveable floors or platforms, mounted on rollers, upon which the heated blooms are placed, and transferred from the furnace to the rolls.

[Printed, 10*d.*]

A.D. 1859, July 6.—N° 1606.

LLOYD, SIMPSON.—"Improvements in the manufacture of cast "steel tyres." A cast steel ingot is taken hot from the mould, and hammered in a suitable dye, so as to form a rib or flange upon it. The ingot is reheated, and rolled into the section of the tyre required. The ends are bent round and joined, welded, or molten steel is run between them, and hydraulic pressure is applied, or the two ends are dipped in a bath of molten steel. Or the tyres may be cast in a continuous ring or circle, an elastic core being used to allow for the shrinking of the metal when cooling.

[Printed, 5*d.*]

A.D. 1859, July 6.—N° 1607.

SCHWARTZKOPFF, LOUIS, and PHILIPPSON, FERDINAND CARL.—"Improvements in steam hammers," &c. The piston carrying the hammer always moves the same distance, and therefore, gives equal blows. The steam cylinder and hammer are fixed in a moveable frame, sliding in V grooves in a main frame. The moveable frame is raised or depressed by suitable lever apparatus, so that the hammer is brought nearer to or further from the work, as may be required, without stopping its blow. The steam pipe moves up and down with the frame, its end passes through a stuffing box.

[Printed, 2*s.* 10*d.*]

A.D. 1859, July 7.—N° 1615.

KNOWLES, Sir FRANCIS CHARLES.—"Improvements in "making iron castings." Nitrate of soda or nitrate of potash is put into the ladle or other vessel, into which the metal is run preparatory to the casting operation, to purify the iron and strengthen the castings. The quantity required depends on the amount of impurities and carbon contained in the iron.

[Printed, 3*d.*]

A.D. 1859, July 8.—N° 1620.

DAWES, William Henry.—"An improvement or improve-"ments in the manufacture of iron." Superheated steam is passed over red hot coal or coke, and the hydrogen and carbonic oxyde generated are collected in a vessel like a gas-holder. The gas is previously cooled in a condenser. The hydrogen gas is forced into the blast furnace at the lower part above the hearth by means of suitable force pumps.

[Printed, 3*d.*]

A.D. 1859, July 8.—N° 1628.

JOHNSON, John Henry.—"Improvements in moulding or "shaping metals by pressure, and in the machinery or apparatus "employed therein."—(*A communication from Levi Dodge, U.S.*) Moveable dies are used which operate simultaneously upon several or all the sides of the metal to be shaped, so as to completely shape the article required by simultaneous die pressure acting all around it. The apparatus which is described with drawings is suitable for making axes and other tools.

[Printed, 3*d.*]

A.D. 1859, July 14.—N° 1665.

MUSHET, Robert.—"A new or improved manufacture of "certain metallic compounds or alloys." Pulverised ores of tungsten, by preference wolfram, are mixed with iron ores, by preference pure rich hematites in various proportions, and are smelted in a cupola or blast furnace to form an alloy or cast metal of tungsten and iron or tungsten, manganese, and iron. The greater the proportion of tungsten the greater will be the specific gravity of the alloy.

[Printed, 4*d.*]

A.D. 1859, July 15.—N° 1674.

MUSHET, Robert.—"New or improved methods of manufac-"turing a certain metallic compound or alloy." The alloy obtained from smelting wolfram ores and iron ores (see *ante*, Patent 1665) may be run into a puddling furnace, and puddled, producing a malleable alloy. Or pulverised deoxydised wolfram ores,

or the alloy of tungsten and iron may be introduced with cast iron into a puddling furnace and be there puddled. Various proportions may be used.

[Printed, 6*d.*]

A.D. 1859, July 15.—N° 1676.

FARRAR, John Prentice.—" Improvements in the treatment " of iron." The iron is treated with cyanogen in any form, or with sal-ammoniac. For ordinary irons the proportions recommended are 1½lb. of prussiate of potash, and 2½lb. of sal-ammoniac to one ton of ore. Or, 1½lb. of each of these ingredients to one ton of pig iron in the cupola, or one ton of wrought iron melted in the crucible.

The ingredients may with advantage be put into the ladle before the molten iron is run into it.

[Printed, 3*d.*]

A.D. 1859, August 3.—N° 1791.

TOOTH, William Henry.—" Improvements in machinery or " apparatus for the manufacture of iron or steel."—*Provisional Protection only.* It is proposed to employ in puddling iron a chamber made of iron lined with fire brick, or other similar material, the chamber is in the form of an elongated cylinder mounted on bearings and made to revolve by means of suitable machinery. The cylinder or chamber communicates at one end with a chimney, at the other with a furnace. Iron is introduced into the chamber, and is heated by the flames passing through it, at the same time the rotatory motion is continued until the iron comes " to nature."

[Printed, 3*d.*]

A.D. 1859, August 8.—N° 1825.

McCALL, Robert.—" Disengaging and abstracting minerals, " especially copper, from mineral waters, more particularly from " water drawn from or issuing out of copper or sulphuric mines, " and for precipitating or depositing such minerals in such waters." —*Provisional Protection refused.* Pulverized grey or white magnetic ore of iron is to be mixed, in proportions which are not stated,

with the mineral waters issuing from copper mines. The copper is precipitated with the ore to the bottom, and is collected and dried.

[Printed, 3*d.*]

A.D. 1859, August 18.—N° 1900.

CANN, Adolphe Joseph.—" Improvements in machines for " breaking or crushing stones, minerals, or other similar materials." Revolving cylinders or cones are employed, having their axes vertical, and arranged round a centre axis, on which revolves a table. The ores or stones are crushed or broken in the confined space between the revolving cylinders and the revolving plate or table; when the ores are crushed small enough, they are allowed to escape between the revolving cylinders and the table. The apparatus is described with drawings.

[Printed, 10*d.*]

A.D. 1859, August 22.—N° 1917.

TAYLOR, Joseph Jepson Oddy.—" An improvement in the " separation of silex and silicious matter from iron." Fluoric acid by preference in the form of fluor spar is mixed with the iron in the cupola or other furnace. To resist the action of the acid, a lining formed of two kinds of clays is used for the furnace, their bases being magnesia and oxide of iron, and a small quantity of silicon.

[Printed, 3*d.*]

A.D. 1859, August 22.—N° 1920.

PARKES, Henry.—" Improvements in the manufacture of " cylinders and tubular or hollow bodies of copper and alloys of " copper or other ductile metals." Old copper-printing rollers are annealed, closed flat by preference, at a red heat, and are, by a process of rolling them flat, worked up again.

Tubes are made of copper and its alloys, silver, gold, aluminum, and their alloys, for hard metals, tin, zinc, and their alloys, for soft metals. A flat block or ingot is rounded at its edges, and has a slit of the right size and shape made through it. It is then *drawn* flat through holes or rolls, decreasing in size every time

the metal is drawn, the flat tube is then opened out and made cylindrical.

Instead of long steel mandrils, a short end of steel may be used, which is fastened to a long stem.

[Printed, 4*d.*]

A.D. 1859, August 23.—N° 1930.

RICHARDSON, THOMAS.—" Improvements in treating copper " ores." Pulverised sulphuret of copper more or less contaminated with sulphuret of iron, copper pyrites, is moistened with salt and water at a temperature of at least 80° F. The copper is dissolved, and may be precipitated by iron. Carbonate or oxide of copper mixed with gangue may be mixed with 10 per cent. of pyrites, and roasted at a red heat; it is then soluble in water.

The ore and pyrites may be treated as described with muriate of soda or potash.

[Printed, 3*d.*]

A.D. 1859, August 31.—N° 1989.

BROOMAN, RICHARD ARCHIBALD.—" Improvements in treat- " ing auriferous and argentiferous ores and substances."—(*Communicated to him from Dr. Raoul Destrem, Paris.*)—*Provisional Protection only*. The auriferous and argentiferous ores are to be mixed with 50 to 75 per cent. of lead ores, and decomposed by heating them in the ordinary furnaces in which lead ores are reduced. Electric currents are to be employed. Other modes of treating the ores mixed with pyrites may be used.

[Printed, 3*d.*]

A.D. 1859, September 3.—N° 2021.

LAUTH, BERNARD.—" Improvements in the manufacture of " rollers or cylinders for calico printers, and of tubes of copper " and brass or mixtures of those metals." The specification and drawings describe rolling apparatus by means of which tubes are rolled " to any required guage and a smoothness of surface," which renders the operations of turning and drawing unnecessary.

The metal tube is held stationary and the rollers are caused to travel thereon, or the rollers are stationary and the tubes are drawn through them.

[Printed, 10*d.*]

A.D. 1859, September 5.—N° 2024.

BARRE, Jean Baptiste Henri Honoré Raymond, and BARRE, Jean Baptiste Marie Ernest.—" Improvements in " cutting out or engraving metals and their alloys."—The design to be produced is drawn on a lithographic stone, the parts intended to be in relief being drawn black. When the design has been " bitten in " the stone is washed with a volatile oil to remove the ink. The stone is then damped, and covered with a composition composed of half strong printer's mordant, half copal oil varnish, with a tenth of printing ink. The design is printed off on paper; then transferred to the plate of metal or alloy; the plate is then powdered with a composition consisting of four-fifths resin, one fifth wax or stearine; the powder adheres to the inked design, the other parts of the plates are dusted, and the plate is then heated. The design is thus covered with a resisting coating, and the other parts may be attacked by acids in the usual way.

[Printed, 4*d.*]

A.D. 1859, September 7.—N° 2047.

HUGHES, Edward Thomas.—" Improvements in machinery " or apparatus for forging metals."—(*A communication from Ernest Damas, Paris.*)—*Provisional Protection only.* It is proposed to attach hammers to a face plate, and by means of suitable guides to make them act as forge hammers by giving rotation to the face plate.

[Printed, 3*d.*]

A.D. 1859, September 13.—N° 2085.

LEVI, George Montefiore.—" Improvements in washing and " separating ores and substances of different specific gravities, and " in apparatus for that purpose."—*Provisional Protection only.* It is proposed to construct a vessel with a central partition which does not quite reach to the ends of the vessel. By means of jets of water the water is made to circulate in the vessel round the partition. The bottom of the vessel is divided into compartments; pulverized ores are to be dropped into the circulating stream of water, and as the particles of greatest specific gravity fall first they are to be deposited in the nearer compartments, while the lighter particles are carried further to the more remote compartments.

[Printed, 3*d.*]

A.D. 1859, September 19.—N° 2128.

McCALL, Robert.—" Improvements in obtaining precipitates of " copper," &c.—*Provisional Protection only*. Pulverised grey, white, or black magnetic iron ores are mixed with mineral waters containing copper. The copper is precipitated with the pulverised ores, and is afterwards collected and dried. The residuum is run off, and may be made into yellow ochre.

[Printed, 3*d*.]

A.D. 1859, September 19.—N° 2132.

WARLOMONT, Hurbert, Joseph.—" Improvements in appa- " ratus to be employed in the manufacture of zinc." Ovens or furnaces for manufacturing zinc with economy, are described with the aid of drawings. The furnaces are constructed in sets of six arranged transversely in pairs, so that the two centre ones are heated by the flames from the four outer ones, the flames being conducted by suitable flues from the two outer or side furnaces, and thence to the main shaft.

[Printed, 6*d*.]

A.D. 1859, October 1.—N° 2229.

BROOMAN, Richard Archibald.—" Improvements in re- " verberatory puddling, and other furnaces employed in the manu- " facture of iron."—(*A communication from G. Dallemagne, of Sclessin, Belgium.*) It is proposed to fix the fire bars of the furnace in grooves made in their supports. Openings are made over the bars, through which a rake or other tool may be introduced, for the purpose of clearing the bars from clinkers.

[Printed, 3*d*.]

A.D. 1859, October 3.—N° 2235.

MOREWOOD, Edmund.—" Improvements in coating metals." Sheets or plates of iron or copper are passed in a wet or damp state into the flux usually placed above the bath of coating metal, or alloy. The superfluous moisture which might cause an explosion, is removed by passing the sheets over a cushion of woollen or other cloth. To insure an equable motion in the plates during their passage into and from the bath of coating metal or alloy, two receiving rollers take the plate and pass it by means of

suitable guides to a pair of rollers revolving below the surface of the molten metal or alloy, these pass the plate to a pair of delivering rollers which receive the emerging plate and deliver it to a pair of chilled or casehardened rollers; these are hollow and may be heated by steam. The plates having been cleaned from any flux that may have adhered to them, receive a polished or brightened surface from being passed through the chilled rollers.

To clean the plates effectually from adhering flux they may be dipped in a bath which is not covered by flux.

[Printed, 8*d.*]

A.D. 1859, October 5.—N° 2257.

EAGLETON, Jehoiada Joseph.—" An improvement or im-" provements in annealing furnaces." Annealing furnaces are made with moveable bottoms, and are supported on piers or columns.

The annealing pot charged with the articles to be annealed can be raised into the furnace, or removed therefrom through an opening in the bottom, as shown in the drawing.

[Printed, 7*d.*]

A.D. 1859, October 10.—N° 2299.

SHAW, Charles Albert.—" Improvements in machinery for " shaping or bending tinned sheet iron and other sheet metal."—(*A communication from William Burton, New York.*)—*Provisional Protection only.* It is proposed to use self-acting apparatus for " turning down the double seam of tinware" after the seam has been formed by other machines, or in any ordinary way.

[Printed, 3*d.*]

A.D. 1859, October 11.—N° 2313.

WHYTOCK, Andrew.—" Improvements in coating sheets of " metal with other metals and other substances." When it is desired to coat sheets of metal intended to form long pieces, the sheets are joined together, in any suitable way, before they are immersed in the bath of coating metal or alloy.

Sheets of strips of any length are thus coated in one continuous operation. Two drums may be used, from one drum the sheets of metal are unwound as they are passed into the bath, while they are wound on the other drum as they emerge coated.

[Printed, 4*d.*]

A.D. 1859, October 14.—N° 2341.

LEVICK, Frederick.—" An improvement or improvements in " the manufacture of iron." A gaseous mixture of hydrogen and carbonic oxide (produced by passing steam over incandescent carbonaceous matters, alone, or mixed with gases from the blast furnace, or those evolved by passing atmospheric air over burning coals) is employed in manufacturing cast into wrought iron.

The gaseous mixture is injected into the puddling furnace near the bridge, on the fire-side thereof; in the refining or remelting furnace it is injected with or near the blast tuyere.

[Printed, 4*d*.]

A.D. 1859, October 14.—N° 2347.

ROBINSON, Thomas. — " Improvements in annealing or " softening wire." The wire required to be annealed is placed in a pot of the usual kind, which is heated in a furnace by means of a blast forced through a tuyere. The fuel is not to be placed round the pot, but in a separate chamber, as shown in the drawings.

[Printed, 7*d*.]

A.D. 1859, October 19.—N° 2390.

BLACKWELL, John Kenyon.—" Improvements in reverbe" ratory and other furnaces."—*Provisional Protection only*. It is proposed to effect a more perfect combustion of the gases, generated by the fuel employed, by introducing into the furnace a blast of heated air " travelling at an equal or preferably a greater velocity " than the gases to be consumed."

[Printed, 3*d*.]

A.D. 1859, October 21.—N° 2407.

GREEN, Jonathan Harrington.—" A composition for " coating metals and other substances for various purposes." A hard elastic coating is given to metallic and other surfaces, vessels, and pipes, by applying a composition formed by mixing: emery 6 oz., pummice stone 4 oz., corundum 2 oz., Paris white 2 oz., lamp

black 1 oz., magnesia 2 oz., india rubber or gutta percha cement 3 oz., linseed oil 1 pint, turpentine ½ pint, slow japanners varnish 1 gill. These ingredients are ground together, and the mixture applied like a paint.

[Printed, 3*d*.]

A.D. 1859, October 21.—N° 2408.

PITMAN, JOHN TALBOT.—"An improved mode of converting "cast iron into soft malleable iron without any change of form."—(*A communication from J. K. Eaton, New York.*) Oxide of zinc alone or with oxide of iron is used as the decarbonizing agent. Castings of any desired form "of the variety called white cast "iron, may be packed in iron boxes, crucibles, or otherwise, as "in the well-known process for making malleable cast iron, "except that oxide of zinc, or a mixture of oxide of zinc and "oxide of iron is used, instead of the ordinary material, the whole "being exposed to a bright red heat in a suitable furnace, the "cast iron is rapidly decarbonised at the expense of the oxygen of "the oxide of zinc." The metallic zinc produced is distilled over and collected as pure metal.

[Printed, 3*d*.]

A.D. 1859, October 29.—N° 2471.

GHESQUIÈRE, GUSTAVE.—"A process to render gold and silver "malleable and ductile." Gold and silver are often brittle from the admixture of foreign matters. They are rendered ductile in one operation of fusing when alloyed with copper.

The gold or silver is melted in a crucible, and to 1000 parts of the metal is added 1 part by weight of a composition, formed by melting 95 parts of borax and 5 parts of protoxide of manganese carefully prepared.

A fluid coating is formed on the surface of the melted gold or silver, which preserves the copper from oxydation.

If foreign metals are present which cause brittleness, currents of air are directed upon the surface of the molten metal. Oxides of the said foreign metals are thereby thrown to the surface, and are removed by mixing with them vegetable coal dust or coke.

[Printed, 4*d*.]

A.D. 1859, November 5.—N° 2523.

CUCHE, Emile Alexandre.—" Improvements in galvanizing " metallic wires."—*Provisional Protection only.* The wire to be coated is cleaned with acid solution and wound on a bobbin, which is placed near a bath of molten zinc. As the wire is unrolled, it is to be passed through the upper beds of the zinc bath. On emerging, it is to be passed through a bed of fine sand, or a suitable guage plate, to cleanse the wire from oxide, or other impurities floating on the bath. The friction also causes a kind of vein or fibre to be formed in the zinc coating, which makes it adhere better to the wire.

An apparatus somewhat similar to an argand burner is used for providing jets of warm or cold air; through the centre of these the wire is passed, to give its coating a vein or fibre round the axis of the wire. Rotating draw or guage plates may be used. To protect the metallic vessel containing the bath of zinc, it is coated internally with silicate of lead or black lead or enamel.

[Printed, 3*d.*]

A.D. 1859, November 14.—N° 2577.

MADIN, John.—" Improvements in furnaces and appliances " connected therewith for hardening and tempering crinoline or " sheet steel, and measuring the same." The steel is heated in a close furnace, having a flue above and below it, as described in the drawings. The strips of steel are fed into the furnace from reels, they enter and emerge through suitable tubes and rolls, and self-acting apparatus regulate the speed at which the tubes are withdrawn. On emerging, they are passed between chilled metallic dies formed of two water-tight vessels placed face to face, to which a flow of cold water is constantly supplied. The steel strips are then passed over a flame of gas covered with wire gauze. Or the steel is tempered by passing it over a heated metallic plate.

[Printed, 9*d.*]

A.D. 1859, November 15.—N° 2586.

BORLASE, Edward.—" Improved apparatus for separating " metals and metallic ores when mingled with other substances " in the state of slime." Apparatus for washing and sifting crushed ores, is described with drawings.

The crushed materials and water are received on an inclined sieve of a cylindrical or other suitable form. The large particles are collected and conveyed to a "hotching," or other separating machine. The small ones are washed, and sorted in another machine called "a distributor."

[Printed, 10*d.*]

A.D. 1859, November 22.—N° 2643.

DAFT, THOMAS BARNABAS.—"An improvement in coating "sheathing metal." Sheets made of Muntz's metal or other yellow metal are pickled and scoured.

Each sheet is covered with a sheet of india rubber compounded with sulphur, suitable for being vulcanized. Over the sheet of india rubber is placed a sheet of tinned iron or zinc, until a pile containing 50 or 100 sheets of yellow metal is made. A strong iron plate is put on the top of the pile, and connected to the lower plate by bolts and nuts; great pressure is then applied, and steam is made to act upon the pile until the sheets of india rubber are vulcanized and adhere firmly to the yellow metal plates.

[Printed, 3*d.*]

A.D. 1859, November 22.—N° 2646.

MUSHET, ROBERT.—"An improvement or improvements in the "manufacture of iron and steel." Pulverised ores of titanium, such as ilmenite and rutile are blown with a suitable blast into molten cast iron. During the smelting process, from 5 lbs. to 20 lbs. of pulverised ores may be mixed with each cwt. of pig iron. In the refining process similar proportions may be used. If titanic acid be used, 1 to 5 lbs. may be injected. The titanic ores may also be injected during the decarbonizing process, in which currents of atmospheric air are employed.

[Printed, 4*d.*]

A.D. 1859, November 23.—N° 2652.

SMITH, JOSIAH TIMMIS.—"An improvement or improvements "in heating, puddling, and other reverberatory furnaces used in "the manufacture of iron."—*Provisional Protection only*. The gases generated in the blast furnace are to be collected, and when mixed with atmospheric air, by preference heated, are to be introduced into the reverberatory furnace, and used for heating it.

[Printed, 3*d.*]

A.D. 1859, December 2.—N° 2731.

SMITH, George Frederick.—"Improvements in smelting "and purifying iron and other ores."—*Provisional Protection only*. An exhaust apparatus is to be used in connexion with and to assist the ordinary fan blast employed in smelting iron ores.

A furnace is described with drawings, having a moveable crucible.

[Printed, 1s. 1d.]

A.D. 1859, December 3.—N° 2735.

RUSSELL, Thomas Robert.—"The application of a certain "metal for the movements of watches and other timekeepers." It is proposed to use nickel and alloys of nickel for movements for watches, and other timekeepers, instead of the metals or alloys ordinarily used for that purpose.

[Printed, 3d.]

A.D. 1859, December 8.—N° 2779.

ALLEYNE, John Gay Newton.—"Improvements in the "manufacture of boilers, ships' tanks, and other hollow vessels of iron and steel."—Plates of iron or steel are welded together to form boilers or tanks, or boats or ships, by employing intervening pieces of iron or steel, shaped like an H or a T. These are called "gluts." The edges of the plate are inserted in the grooves or angular recesses of the glut, and are heated by a portable furnace, and welded thereto by hammering, and sometimes by rolling, when the shape admits of that process.

[Printed, 10d.]

A.D. 1859, December 8.—N° 2781.

ARROWSMITH, John.—"Improvements in the manufacture "of beams or girders of wrought iron, and in rolling machinery "and furnaces." Plates or bars of iron are combined with pieces of angle iron to form girders or beams, or plates of the required shape, as shown in the drawings annexed to the specification. Plates of wrought iron suitable for batteries and gun boats, may be readily made 18 feet long, 4 feet wide, and 4½ inches thick. Rolling machinery for rolling and furnaces for heating the plates, are described.

[Printed, 1s. 7d.]

A.D. 1859, December 8.—N° 2783.

GRAY, Robert, and SCHOLFIELD, Thomas Houghton.—"Improvements in flattening and tempering steel wire and sheet "steel, and also in the tubes employed in the furnaces."—*Provisional Protection only.* It is proposed to pass the steel, whether in wire or sheet, through fire clay tubes placed in a suitable furnace. The steel is taken from the tubes to the rolls, which are kept cold by means of hollow casings, which are supplied continually with cold water.

[Printed, 3*d.*]

A.D. 1859, December 20.—N° 2812.

STICKLAND, David.—"An apparatus for separating, sifting, "sorting, and cleansing mineral ores."—*Provisional Protection only.* Pulverised minerals are to be sifted, sorted, and cleansed, either in a wet or dry state, by means of apparatus consisting of a rocking cradle with a bottom composed of iron bars, which is worked in connection with a spalling bed and sorting sieves. A reservoir of water is to be placed above the cradle, and may be used when required.

[Printed, 3*d.*]

A.D. 1859, December 14.—N° 2838.

BEDSON, George.—"Improvements in puddling furnaces." The puddling furnace is constructed with sides and bottom made of wrought iron chambers, through which a continual supply of water is fed. The hollow chambers are disconnected, and may be removed when requisite.

[Printed, 6*d.*]

A.D. 1859, December 14.—N° 2843.

RHODES, Joseph.—"Improvements in steam hammers." The hammer head is affixed to a moveable cylinder working on a stationary piston supported above, while what may be called the piston rod has escape and inlet passages for steam. The steam is admitted to the under side of the piston to aid the action of the weight of the hammer. The standards supporting the piston are adjustable.

[Printed, 1*s.*]

A.D. 1859, December 15.—N° 2859.

FLEETWOOD, Daniel Joseph.—"Improvements in ma-"chinery for raising and stamping metal." The specification and drawings describe apparatus for raising and stamping soft metals and alloys. The bed or bottom die is fixed, and has a forcer or ram passing through it, on which is formed part of the device of the bottom die. The upper die is moveable, and has a ram or forcer passing through it, its under surface is made with part of the device of the upper die thereon. The forcers are actuated by suitable hydraulic or other pressure, and the upper die has a quick up and down motion given to it.

[Printed, 7*d.*]

A.D. 1859, December 16.—N° 2867.

MORRISON, Robert.—"Improvements in double and single "action steam hammers." The specification and drawings describe a steam hammer, in which a slot link is used for working the valves, so that a partial movement of the hammer produces a corresponding partial movement of the valve.

Duplex valves and cylindrical valves formed with spiral edges are described, also adjustable parts or slide faces.

The valve gear is also worked by hand, so as to admit steam under the hammer piston only.

[Printed, 2*s.* 1*d.*]

A.D. 1859, December 20.—N° 2900.

HENDERSON, William.—"Improvements in treating certain "ores and alloys, and in obtaining products therefrom." Copper and other ores when they exist in, or are artificially reduced to, the state of salts of copper or other metals, mixed with substances insoluble in acids, as silica, are pulverised, and, when necessary, calcined, so as to convert the sub-oxide into the protoxide of copper.

The ores are washed in apparatus described in a former specification (see Patent N° 2517, A.D. 1857.) The crushed ores are covered with diluted sulphuric acid of 1·20° to 1·40° specific gravity, and the solution pumped back and allowed to percolate through the ores until saturated with copper or other metal. The metal is subsequently recovered from the solution by evaporation, or crystallization.

Metallic copper is produced from the anhydrous sulphate, by pulverising and mixing with it from 10 to 20 per cent. of charcoal or other carbonaceous powder, and heating the mixture in a closed vessel.

Means of recovering from mixed ores, cobalt, by the use of muriatic acid, and silver, by the use of a solution of salt, are described.

Ores containing a proportion of sulphur more than 1½ times that of the metal or metals to be extracted, are calcined to reduce the proportion of sulphur, and are mixed with 5 to 50 per cent. of common salt, and heated.

A furnace, having two or more beds, each having a separate condenser, and heated by a common fire, may be employed for the processes described; one ton of brimstone made into sulphuric acid is said to extract 10 to 15 tons of metallic copper from the ores.

[Printed, 5*d.*]

A.D. 1859, December 24.—N° 2941.

SMITH, Edwin.—"Improvements in ornamenting metal pipes "or tubes."—*Provisional Protection only.* It is proposed to ornament metal pipes or tubes by means of self-acting apparatus, constructed like a screw cutting lathe, which is used for engraving or cutting ornamental designs upon the tubes.

[Printed, 3*d.*]

A.D. 1859, December 27.—N° 2949.

LEVICK, Frederick.—"Improvements in puddling and other "reverberatory furnaces," &c.—*Provisional Protection only.* It is proposed to construct puddling furnaces, having gas-generating apparatus connected therewith, similar to the German furnaces, for the purpose of supplying a mixture of hydrogen and carbonic oxide, produced by passing steam over heated coke. The gaseous mixture is delivered near the bridge.

The waste heat of the furnace is used to superheat the steam and heat coke, and also heat the ordinary steam boiler supplying the engine.

[Printed, 3*d.*]

A.D. 1859, December 29.—N° 2972.

FEARNLEY, Thomas.—"Improvements in steam hammers." The length of stroke is regulated by means of a series of cam surfaces, "each adapted to act upon a truck or bowl upon lever "arms or such like means, in connexion with the steam valve." The lever arms are made to act upon the respective cam surfaces, "the one to operate for the up, the other for the down stroke," in the manner shewn in the drawings. The steam valves may be operated independently by hand if requisite.

[Printed, 6d.]

A.D. 1859, December 29.—N° 2973.

RUSSELL, Thomas Robert.—"The application of certain "metals or materials to the manufacture of the movements of "watches or other timekeepers." Pure gold, silver, German silver, platina, zinc, and tin, and alloys of these metals are used in making the movements, or special parts of the movements of clocks and watches.

[Printed, 3d.]

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